AIR CAMPAIGN

KURSK 1943

Airpower in the Eastern Front's most pivotal battle

WILLIAM E. HIESTAND | ILLUSTRATED BY GRAHAM TURNER

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INTRODUCTION

The Il-2 Shturmovik was the key Soviet strike aircraft of World War II, and at Kursk was used much more heavily – and took many more losses – than the VVS's Pe-2- and Boston-equipped bomber divisions. At Kursk, the Il-2s engaged enemy armor with the new PTAB antitank bombs in addition to cannon fire, bombs, and rockets. (Sovfoto/Universal Images Group via Getty Images)

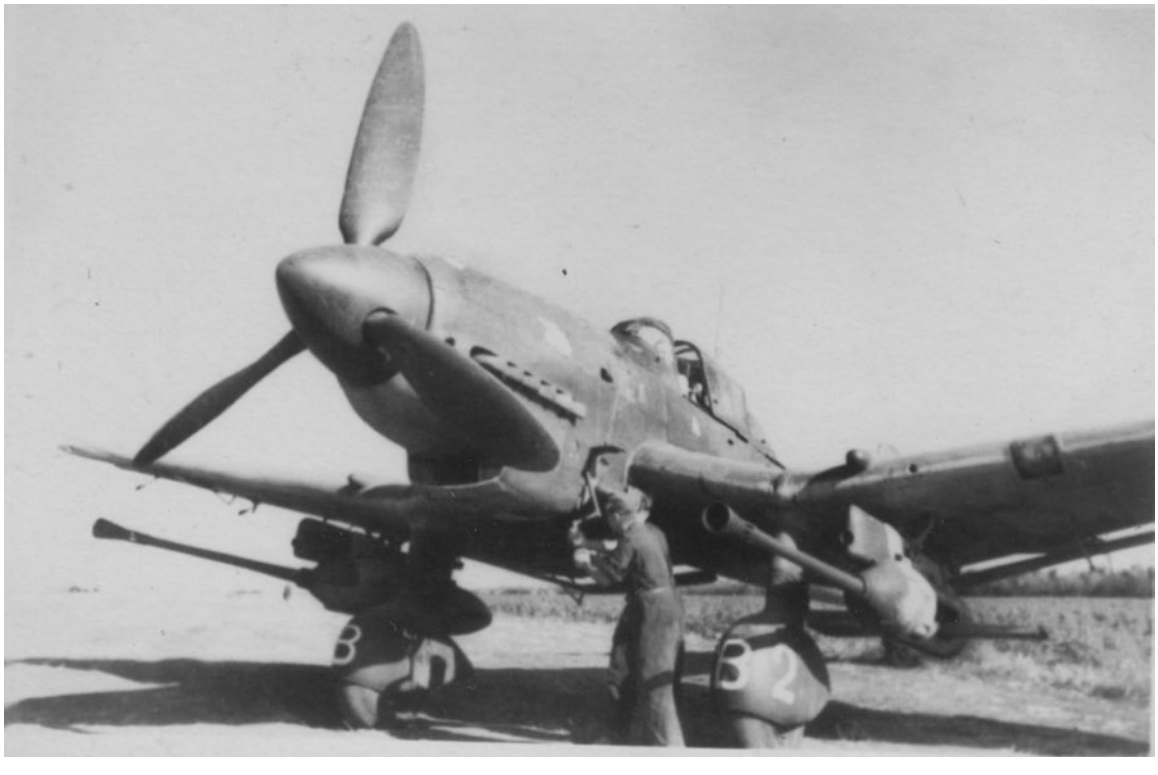
The battle of Kursk is widely known as the decisive clash of armor that turned the tide on the Eastern Front. In the summer of 1943, Hitler threw 50 divisions, 19 of them Panzer or Panzer-Grenadier, against the Soviet-held Kursk salient to regain the strategic initiative in the east. The failure of Operation *Zitadelle* was followed by Red Army offensives during the late summer and fall that drove the Wehrmacht back to the Dnieper River and beyond. Apart from references to tank-killing Il-2 Shturmoviks and Ju 87 Stukas sporting twin 37mm cannon pods, the role of the Luftwaffe and Soviet Air Force (VVS) during *Zitadelle* often receives little or no attention in accounts of the battle, although the air battle over Kursk was one of the largest of the war. Over 4,000 aircraft battled for air superiority and to influence the ground battle, and over 1,000 aircraft were lost in action in just a few days of intense combat in a geographically confined area.

Zitadelle emerged from Germany's 1942 defeat at Stalingrad. On November 19, Soviet forces launched Operation *Uranus*, with concentric attacks routing the Romanian armies north and south of the 6th Army and rapidly encircling it in the city. VVS forces coordinated by Commander-in-Chief Aleksandr Novikov played a major role in the victory by interdicting Luftwaffe efforts to resupply the trapped German army by air. Axis forces in the south were in full retreat towards the Ukraine when the last remnants of the 6th Army surrendered on February 2. The Soviets were in hot pursuit, launching Operation *Gallop* to retake the Donbas, and Operation *Star* to capture Kharkov.

German forces were able to recover their balance as they retreated along their lines of communications. Field Marshal Erich von Manstein was given command of all German forces in the area, received the II SS Panzerkorps as reinforcements, and prepared to launch a counterstrike against the now-overextended Soviet pursuers. The Luftwaffe command in the south, Luftflotte 4, also regained strength as it fell back on better-supplied and equipped bases. Newly promoted Field Marshal Wolfram von Richthofen, Luftflotte 4's energetic commander, sent non-operational aircraft to the rear for repairs, and consolidated and strengthened his units. Richthofen's revitalized *Geschwader* were able to powerfully support

von Manstein's "backhand blow" counterattack and at the same time successfully resupply the German 17th Army to the south, which Hitler had insisted maintain a bridgehead on the Kuban peninsula to ensure a threat to the Caucasus oilfields. The VVS had been able to forward deploy only limited numbers of aircraft and could provide little opposition as von Manstein's Panzer thrusts cut off the Soviet spearheads. German forces recaptured Kharkov on March 14 and Belgorod four days later, but the spring thaw prevented a planned strike north to retake the recently formed salient around Kursk. As a result, Army Group Center now controlled a salient around the city of Orel, while to the south Red Army forces were able to retain a 120km-wide and 144km-deep salient around Kursk.

Even before the completion of von Manstein's counteroffensive, Hitler ordered the Army High Command (OKH) to begin planning for a summer offensive. The multiplying threats facing the Reich and the losses suffered the year before ruled out a grand offensive on the scale of 1941 or 1942. Axis forces were isolated in Tunisia, the Battle of the Atlantic was reaching its climax, and US and British heavy bomber forces were intensifying the strategic bombing campaign against the German homeland. The resolve of Hitler's Axis allies was wavering, with even Mussolini suggesting peace talks with the USSR. Hitler visualized a grand strategy for the Eastern Front resembling the German retreat to the Hindenburg Line in 1917, with Axis forces retiring to a strong fortified line from which they could destroy any Red Army offensive. The line, known as the Panther or Ostwall, would stretch from Leningrad, along the Dnieper River, and ultimately to the Sea of Azov. As the fortifications would only be completed in late 1943, planning for summer operations involved a limited offensive when the weather improved, and attention soon focused on the exposed Kursk salient. Massed Panzer divisions supported by the bulk of the Luftwaffe in the east would pinch off the salient with thrusts from the north and south. A successful offensive at Kursk would regain the initiative for the Axis on the Eastern Front, potentially opening the way for follow-on operations, including an assault in the Leningrad area to establish a land link with Finland.



Small numbers of the new Ju 87 G 37mm-armed variant were in action during Operation *Zitadelle*. Famously, Stuka ace Hans-Ulrich Rudel used his Ju 87 G to knock out 12 Soviet tanks in one day, most likely during the climactic tank clash near Prokhorovka on July 12. (Courtesy of the Central Museum of the Armed Forces, Moscow via Stavka)

Eastern Front July 5, 1943
XXXXX
Leningrad
XXXX
VVS KBF
XXXX
13 VA
XXXX
14 VA
Leningrad
Tikhvin
Volkhov
XXXXX
Volkhov
Luga
XXXX
1 LF
Novgorod
XXXXX
Staraya Russa
XXXX
6 VA
North-western
XXXXX
Pskov
North
XXXXX
Ostrov
XXXXX
Kalinin
Kalinin
Volga
XXXXX
Western
XXXX
3 VA
Rzhev
Moscow
SOVIET UNION
XXXX
1 VA
Vitebsk
Smolensk
Dnepr
XXXXX
Bryansk
XXXXX
Minsk
XXXX
15 VA
XXXXX
Central
XXXX
6 LF
Bryansk
XXXX
16 VA
Orel
XXXXX
Steppe
Gomel
Desna
XXXXX
Voronezh
XXXX
5 VA
Pripiat
XXXXX
Center
Kursk
XXXX
2 VA
Voronezh
XXXXX
South-western
Kiev
Belgorod
Zithomir
Kharkov
XXXX
17 VA
Rossosh
Don
UKRAINE
Poltava
XXXXX
South
Cherkassy
Dnepr
XXXXX
Southern
Uman
Southern Bug
Voroshilovgrad
Dnepropetrovsk
XXXX
8 VA
Dnestr
Krivoi Rog
XXXX
4 LF
Stalino
Donets
Don
Rostov
Kishinev
Odessa
Sea of Azov
XXXXX
North-Caucasus
XXXX
4 VA
XXXXX
A
Krasnodar
Sevastopol
Novorossisk
Black Sea
XXXX
VVS CHF
N
0
100 miles
0
100km

OPPOSITE KURSK:STRATEGIC OVERVIEW, JUNE 1943

Strategically, such a success would reaffirm the Wehrmacht's dominance over the Red Army during the summer months, stiffen support from Germany's allies, and, in the words of the plan, send a "beacon to the world" of continuing Axis military prowess.

Von Manstein urged that the offensive, designated Operation *Zitadelle*, begin as soon as the ground was firm enough in the spring, but it suffered from repeated delays. Soviet intelligence services provided warning of German intentions, and Marshal Georgy Zhukov convinced Stalin that it would be advantageous to stand on the defensive and wear down the attacking Wehrmacht before unleashing the Red Army's own summer offensives. Luftwaffe aerial reconnaissance began to detect the massive buildup of Red Army forces within the salient, and Hitler repeatedly postponed the offensive to strengthen the Panzer units slated for the attack with Tiger heavy tanks and new Panther medium tanks. The Luftwaffe was expected to play a major role in *Zitadelle*, compensating for the German inferiority in artillery and helping blast a way through the deep, sophisticated Soviet defenses.

In the spring of 1943, as both sides strengthened their forces at Kursk, Soviet forces launched a series of offensives aimed at forcing the 17th Army from the Kuban back to the Crimea, leading to several months of intense ground and air combat. Although the Red Army attack made only limited progress on the ground, the VVS 4th and 5th Air Armies developed increasingly effective tactics as they battled elements of Luftflotte 4 for control of the air over the Kuban. Soon, however, the Luftwaffe began to concentrate all available airpower for *Zitadelle*'s A-Tag, now set for July 5, assembling nearly 2,000 combat aircraft, about two thirds of German airpower in the east. The Soviets allocated about 2,500 VVS aircraft to the front, along with the bombers of Long Range Aviation (*Aviatsiya dal'nego deystviya* or ADD) and defensive fighters of the PVO, and backed by the reserve 5th Air Army of the Steppe Front.

CHRONOLOGY

1942

November 19 The Soviet Operation *Uranus* offensive that will encircle Stalingrad begins; over the next weeks, the Luftwaffe's Luftflotte 4 is unable to adequately supply the surrounded German 6th Army due to the inadequate number of operational transport aircraft, poor weather, and the VVS's air blockade.

1943

January 29 The Soviets launch Operation *Gallop* to retake the Donbas region; Operation *Star* begins four days later aimed at capturing Kharkov and Kursk.

February 2 The last elements of the 6th Army surrender in the ruins of Stalingrad.

February 8 and 16 Soviet troops capture Kursk and Kharkov.

February 19 Manstein's "Backhand Blow" counteroffensive begins, supported by the aircraft of the now-revitalized Luftflotte 4, led by Marshal Wolfram von Richthofen.

March The RAF initiates the battle of the Ruhr with sustained night bombing attacks and the US 8th Air Force begins daylight bomber raids into Germany.

March 13 Hitler orders OKH to begin planning for a summer offensive on the Eastern Front.

March 14 General Eduard Hauser's II SS Panzerkorps recaptures Kharkov.

April–June The Soviets launch an offensive to drive the German 17th Army out of the Kuban peninsula in the south, leading to intense air combat over the bridgehead; for the first time, VVS airmen fight their Luftwaffe opponents to a standstill, but many of the tactical and operational lessons learned are not implemented by the largely inexperienced air armies that will fight at Kursk.

April 12 Stalin agrees to allow Soviet forces to stand on the defensive and wear down the Germans before launching their own summer offensive. The Stavka reinforces the Kursk salient and Red Army troops augmented by civilian workers build deep defensive lines over the next several months.

April 15 Hitler issues Operations Order No. 6 for Operation *Zitadelle*. Army Group Center and Army Group South will launch concentric attacks on the flanks of the Kursk salient to encircle and destroy the defending Central and Voronezh Fronts.

A wrecked Bf 109 in the ruins of Stalingrad. During the winter of 1942–43, Luftflotte 4 failed to resupply the surrounded 6th Army and suffered heavy losses in the attempt. Luftflotte 4 was led at Stalingrad by Wolfram von Richthofen, although he transferred to a command in the Mediterranean before the 1943 Kursk offensive and the formation Flak corps commander, General Otto Dessloch, was appointed acting commander for *Zitadelle*. (Pictures from History/Universal Images Group via Getty Images)

May 3–6 During a planning conference at Munich with the major commanders, Hitler remains uncertain about the timing of the offensive. Concerned by the Soviet buildup, he ultimately orders *Zitadelle* postponed until June 12 to allow additional new-production tanks to join the attack force.

Early May OKL redesignates *Luftwaffenkommando Ost*, the Luftwaffe formation that has supported Army Group Center since late 1941, Luftflotte 6.

May 6–8 Concerned that *Zitadelle* will begin in mid-May, the VVS launches a series of raids intended to destroy Luftwaffe aircraft on their airfields. The first raid catches the Germans by surprise, but subsequent raids take heavy losses, ultimately costing the VVS 122 aircraft in return for only 25 Luftwaffe aircraft destroyed or damaged.

May 13 Axis forces in Tunisia surrender. Later in May, Admiral Karl Dönitz orders the cancelation of further U-boat attacks on the Allied Atlantic convoys.

June 2 The Luftwaffe launches a large-scale raid on the Kursk rail station, designated Operation *Carmen*, but losses and disappointing results lead the Germans to abandon large daylight bomber raids against major targets behind Soviet lines.

June 4–22 General Robert Ritter von Greim, commander of Luftflotte 6, initiates a strategic bombing campaign targeting the GAZ tank works at Gorky, oil refineries at Saratov, and rubber plants at Yaroslavl. The night bombing campaign begins with a 128-bomber raid on Gorky, followed by a series of raids, many with over 100 bombers. Luftwaffe losses are low, but the impact on the Soviet war effort is minimal, as only three targets are attacked and the Gorky plant only produces T-70 light tanks.

June 8–10 Another series of VVS raids on German airfields claims to destroy 580–750 enemy aircraft, but only destroys eight at a cost of 25 Soviet aircraft.

June 21 Hitler sets July 2 as start date for *Zitadelle*.

July 1 Hitler delays A-Tag for *Zitadelle* to July 5.

July 4 To obtain tactical surprise, the Luftwaffe only forward deploys many of the aircraft allocated for the offensive to bases near the attack zone during the evening of the 4th. Although Soviet intelligence had passed strategic warning of the *Zitadelle* plan, it is unable to identify the exact day and time of the assault until German prisoners taken on the 4th confirm the attack will begin the next day.

A Soviet pilot from the 16th Air Army poses in front of his Yak-1 fighter, damaged when he rammed a Luftwaffe Fw 189 reconnaissance aircraft in September 1942, during the Stalingrad campaign. Beginning in 1941, Soviet pilots would sometimes ram enemy aircraft when out of ammunition in what was termed a "taran" attack, often at the cost of their own lives. When pilots crashed their damaged aircraft into ground targets, it was known as a "fire taran." (Photo by Keystone/Hulton Archive/Getty Images)

July 5 A-Tag for *Zitadelle*. Both sides fly a total of almost 8,000 sorties. Preemptive airstrikes in the early morning hours by the 2nd and 17th Air Armies against German airfields in the south fail to destroy aircraft on the ground and suffer heavy losses. To the north, 16th Air Army commander General Sergei Rudenko remains uncertain that the offensive has truly begun, leading to a halting and piecemeal initial commitment of his

force. The 4th and 6th Luftflotte provide excellent close air support to the advancing German ground force, and their fighters inflict heavy losses on Soviet aircraft throughout the day. The VVS loses 258 aircraft and the Luftwaffe 45. That evening, Stalin demands the 16th Air Army secure control of the air the next day.

July 6 Although the German ground attacks are behind schedule both in the north and south, generals Konstantin Rokossovsky and Nikolai Vatutin hastily order their armored reserves to counterattack. Rudenko orders his 16th Air Army to launch a series of massed attacks early in the morning, but after the first wave they are intercepted by German fighters. As on the 5th, the Luftwaffe provides capable close air support to the Panzer spearheads north and south, and the Bf 109s and Fw 190s continue to inflict heavy losses on their Soviet opponents. Alarmed by his heavy fighter losses, Rudenko asks for reinforcements and receives a fighter division transferred from the Bryansk Front's 15th Air Army.

July 7 Receiving reports of high loss rates, VVS Commander-in-Chief General Aleksandr Novikov sends inspection teams to identify lessons to improve operations. Stavka orders the 5th Guards and 5th Guards Tank Armies from the Steppe Front to reinforce the Voronezh Front and prepare for a counterattack. With its forces concentrating on close air support missions, Luftwaffe reconnaissance does not detect the movement of the Soviet reserves toward the front.

July 8 Two of 17th Air Army's three air corps stand down due to losses. VIII. Fliegerkorps' specialized antitank Hs 129s launch heavy attacks to repel Voronezh Front's 2nd Guards Tank Corps on the II SS Panzerkorps' flank. As Model's 9th Army attack has stalled, General Hans Seidemann's VIII. Fliegerkorps is ordered to send forces to reinforce Luftflotte 6's 1. Flieger-Division, but von Manstein hopes to achieve a breakthrough with his II SS Panzerkorps, and Seidemann delays sending the bulk of the reinforcements for several days.

A formation of Il-2 Shturmoviks in the early years of the war. The Il-2 was originally produced as a single-seat attack aircraft but proved extremely vulnerable to attack by Luftwaffe fighters. In 1942, some Shturmoviks were modified in the field with a gunner mounted in the rear sitting on a canvas strap and firing a 12.7mm UBT machine gun. By July 1943, most of the Shturmoviks in the force were the newer Il-2m3 two-seat variant with the rear gunner and a more powerful AM-38F engine to compensate for the added weight. Dwindling numbers of single-seat variants survived in the force until 1944. (Sovfoto/Universal Images Group via Getty Images)

July 10 General Walter Model's 9th Army's last attempt to penetrate the Central Front's second line of defenses by taking the fortified towns of Ponyri and Olkovatka fails, and he suspends his offensive. Allied forces launch Operation *Husky* and land in Sicily, increasing Hitler's concern for Italy's wavering allegiance to the Axis alliance.

July 11 Von Manstein continues to believe a breakthrough is achievable in the south. The II SS Panzerkorps has penetrated the Voronezh Front's third line of defense and begins to near Prokhorovka, hoping to push on to Kursk. The 5th Guards and 5th Guards Tank Armies arrive and prepare to launch a counterattack on the 4th Panzer Army's spearheads.

July 12 In the south, the 5th Guards Tank Army and other Soviet forces launch a major counteroffensive against von Manstein's forces, suffering heavy losses but forcing the Germans to halt the II SS Panzerkorps' advance on Prokhorovka. The weather is stormy, but both VVS and Luftwaffe aircraft are active during the day. In the north, the Soviet Western and Bryansk Fronts begin Operation *Kutusov* against the Orel salient supported by their 1st and 15th Air Armies, respectively. Luftflotte 6 pulls all available aircraft to support the 2nd Panzer Army. The reinforcements from Seidemann's VIII. Fliegerkorps, ordered days before, begin to arrive.

July 13 Hitler orders *Zitadelle* suspended, and wants to send the II SS Panzerkorps to Italy, where he believes its high level of political indoctrination will help keep Mussolini in power. Von Manstein protests and is permitted to continue limited attacks on his Army Group South front, although Seidemann's VIII. Fliegerkorps is weakened by the dispatch of reinforcements to 1. Flieger-Division.

July 15 After five days of recovery the Central Front is able to join in the *Kutusov* offensive with strong support from Rudenko's 16th Air Army. Army Group South halts its limited attacks in the south and transitions to the defense.

July 17–August 2 The First Donbas Strategic Offensive: the Soviet Southern and Southwestern Fronts supported by the 8th and 17th Air Armies attack Army Group South elements holding the front south of Kharkov. Both fronts establish bridgeheads over the Mius River, but German Panzer reserves contain the Soviet advances.

July 31 Hitler authorizes Model to withdraw from the Orel salient to the Hagen defense line at its base. VVS attempts to interdict the retreat have limited success, and the Luftwaffe is able to evacuate large numbers of wounded and help fly out supplies during the retreat.

August 3–23 The Soviets launch Operation *Rumyantsev*, aimed at retaking Kharkov and Belgorod. The Voronezh and Steppe Fronts attack with air support provided by their 2nd and 5th Air Armies. The initial assault breaks through and takes Belgorod on August 5, but German reserves engage Soviet armor and slow the exploitation. After heavy fighting the Soviets recapture Kharkov on August 22.

August 5 Soviet forces capture Orel. The VVS makes efforts to use captured airfields, although the Luftwaffe plows up airstrips and destroys base infrastructure before retreating.

August 13–September 23 The Second Donbas Strategic Offensive. The Southwestern and Southern Fronts launch a renewed offensive across the Mius River, again supported by the 17th and 8th Air Armies. General Kurt Pflugbeil's IV. Fliegerkorps and the 95 aircraft of the Romanian Air Corps support the defense. By September, von Manstein's entire front is being forced off his defensive lines and back towards the Dnieper River.

August 18 Chief of OKL Hans Jeschonnek commits suicide after being informed by Goering that he will not be allowed to leave his post, and in the wake of USAAF and RAF raids on Regensburg/Schweinfurt and Peenemünde.

August 18 Operation *Kutusov* ends.

September The Red Army has driven Army Group South from its prepared defenses and river lines, and a general offensive begins all along the front. By September, von Manstein's forces are driven to the Dnieper River, but Soviet forces are able to cross and establish several bridgeheads.

November 6 Soviet forces retake Kiev.

ATTACKER'S CAPABILITIES

The Luftwaffe under pressure

An He 111 H-16 model. The H-16 was the third and last mass production model of the He 111, with over 1,500 H-16s built of the over 6,500 total. He 111 production ended in September 1944 as the Luftwaffe shifted piston engine production fully to fighters, although work continued on jet-engine bombers. He 111s served to the last day of the war, with some modified to launch V-1 flying bombs against Britain from the North Sea after losing launch sites in France. (© Museum of Flight/ CORBIS/Corbis via Getty Images)

German airpower faced Allied pressure on all fronts as it marshalled its forces for its last offensive on the Eastern Front. In addition to the demands of *Zitadelle*, forces were being drawn to the Mediterranean theater and Germany, increasingly under attack by Allied bombers during night and day, was becoming an ever-higher priority. Although the defeats of 1942 had pushed the Nazi regime to begin to transition to a full war footing, Germany was still unable to produce the numbers of aircraft and trained aircrew the Luftwaffe desperately needed, and Goering continued to pursue a variety of inadequate, short-term measures. In June 1943, Luftwaffe strength was up to 7,089 aircraft, the first time it exceeded 7,000 since the beginning of the war, but less than half of this force could be spared for the Eastern Front.

The Luftwaffe in the east remained heavily outnumbered by its Soviet opponents, but exploited its high mobility, superior organization, and superbly trained and highly experienced staff and aircrews to meet crisis after crisis. Its strength in the east had increased from about 1,600 aircraft in February to 1,998 in April, and 2,334 in June despite the 940 aircraft lost to enemy action along with 785 to accidents and other non-combat causes during the spring. Aircraft quality also improved in early 1943, with more Fw 190s joining fighter and fighter bomber units, and the Luftwaffe forming new antitank Panzerjäger units.

Luftwaffe doctrine

Although a separate and independent service – a status jealously defended by Reich Marshal Hermann Goering – the Luftwaffe had always closely integrated its operations with the army. Air force and army staffs routinely conducted joint planning to ensure air integration with ground force schemes of maneuver, and Luftwaffe officers known as "*flivos*" for *Fliegerverbindungstruppen* (aviation liaison troops) were posted with ground force headquarters to update the Luftwaffe chain of command on the battlefield situation and arrange for air support. Before Kursk, Luftwaffe doctrine called for major offensives to begin with

sustained strikes on enemy airfields to destroy its opponent's ability to contest command of the air. Subsequently, the Luftwaffe would turn its aircraft to supporting the operations of the ground forces, predominantly through interdiction strikes to isolate the battlefield. Luftwaffe aircraft would hit rail-related and other line-of-communication targets, along with logistical facilities, headquarters, and troop concentration areas. Earlier in the war, close air support strikes directly in support of advancing German troops were conducted, but battlefield interdiction was considered of at least equal importance. Luftwaffe force structure in the early years of the war was better suited to interdiction, with Ju 88 and He 111 bombers and even Stukas – able to hit targets such as bridges with accurate dive-bombing attacks – ideal for such operations. In contrast, the Luftwaffe began the war with only a small force of Hs 123 biplane and Bf 109 fighter bomber ground attack aircraft in a small number of specialized ground attack units.

He 111 bombers flying a mission over the Eastern Front early in 1943. Luftwaffe doctrine placed great emphasis on interdiction operations, which were broadly defined as any target behind the lines that supported an enemy army. In the months before *Zitadelle* the Luftwaffe launched numerous raids on the Soviet rail network, but during the Kursk offensive itself, Luftflotte 4 and 6 dedicated almost all their sorties to direct support of the attacking German ground forces. (Heinrich Hoffmann/ ullstein bild via Getty Images)

The intense and sustained combat on the Eastern Front, however, led to constant calls for air support by hard-pressed army units, and even in the first weeks of Operation *Barbarossa* Ju 88s and even He 111 bombers were repeatedly pulled into such tasks. VIII. Fliegerkorps, led by Wolfram von Richthofen, was the preeminent Luftwaffe close air support formation, controlling the few *Schlacht* ground attack units on the Eastern Front, and combining them with well-orchestrated Stuka strikes. Richthofen's forces demonstrated their superior battlefield close support abilities at the 1942 siege of Sevastopol and the battle for Stalingrad, where he reported his airstrikes often struck within "grenade-throw" range of the forward troops. Although the Luftwaffe continued to pursue interdiction operations when possible, and even dabbled with a small strategic bombing effort during the weeks before *Zitadelle*, by the summer of 1943 it had fully embraced the need for direct ground support. During the battle for Kursk, Luftflotte 4 and 6 would devote virtually all their sorties to executing or protecting close air support operations at or near the front.

The aircraft

Although the gap in aircraft quality with the VVS had narrowed by the summer of 1943, the Luftwaffe still retained a significant qualitative edge, particularly with fighter aircraft, greatly magnified by the superior training and experience levels of many German pilots and aircrew. VIII. Fliegerkorps contained five fighter *Gruppen* with Bf 109 fighters, and 1. Flieger-Division had four fighter groups with Fw 190s. The Bf 109 G-4s and G-6s, and Fw 190 A-5s outclassed the opposing Yak-1s, Yak-7Bs, and La-5s in engine power and armament. The Focke-Wulf Fw 190, first deployed to France in the west in 1941, was an excellent fighter in the low-level engagements typical in the east. With its wide-set undercarriage legs, the

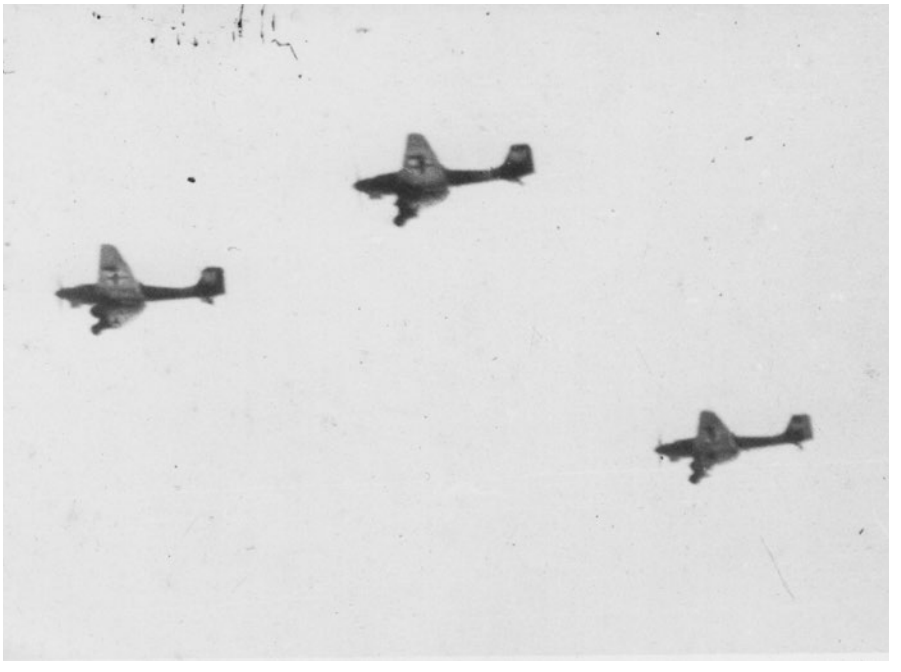
Fw 190 was much more suitable for operating on the primitive grass or dirt strips than the Bf 109 with its close-set landing gear. The newest Soviet design, the La-5FN with its 1,470hp engine, exceeded German fighters in speed and maneuverability, but only small numbers had reached the VVS by July 1943.

The Luftwaffe fought in 1943 with the same basic bomber and dive-bomber types that it had when it invaded the USSR two years before. 1. Flieger-Division controlled five groups of He 111s and VIII. Fliegerkorps six groups. The He 111 was a capable medium bomber but carried a light defensive armament. There were three groups of Ju 88s in Seidemann's 1. Flieger-Division, and two groups in VIII. Fliegerkorps. The Ju 88 was a versatile aircraft that served as both a level and dive bomber as well as a night fighter. The Soviet rail net was a continual target for Luftwaffe strikes, with both Luftflotte 4 and 6 renewing raids against it during early 1943, and some He 111s and Ju 88s had additional specialized armament fitted for train-hunting missions.

A German Bf 109 G "Gustav" fighter – captured by the Allies – in 1944. Luftflotte 4's fighter units were equipped with Bf 109 Gs and Luftflotte 6 with Fw 190 As. The narrow landing gear arrangement on the Bf 109 allowed the wings to be easily removed and replaced for maintenance, but led to numerous accidents on take-off and landing, especially on the primitive airstrips common on the Eastern Front. (US Army Air Force/ PhotoQuest/Getty Images)

The Ju 87 Stuka dive bomber was one of the most famous Luftwaffe aircraft of the war and became a symbol of the early Nazi *Blitzkrieg* victories. The Stuka was slow and vulnerable to enemy fighters and antiaircraft fire, but on the Eastern Front retained its effectiveness given the dominance of Luftwaffe fighters well into 1943, and the Ju 87's ability to accurately deliver its bombs on target. Seidemann had six Stuka groups and General Paul Deichmann four. The threat from Soviet antiaircraft fire led to strengthened armor on the D models in the force in 1943, and the D-5 had its two-wing-mounted 7.92mm machine guns replaced by MG 151 20mm cannon. The first Ju 87 D-5s arrived in June 1943 just before the Kursk offensive. With their continued vulnerability to Soviet fighters and ground fire, by 1944 the Stukas were largely transferred to night operations.

The increased Luftwaffe focus on close air support in the east had led to the development of additional ground attack capabilities, with a particular focus on the ability to destroy enemy armor. VIII. Fliegerkorps contained *Schlachtgeschwader* 1 with Fw 190 F-4 fighter

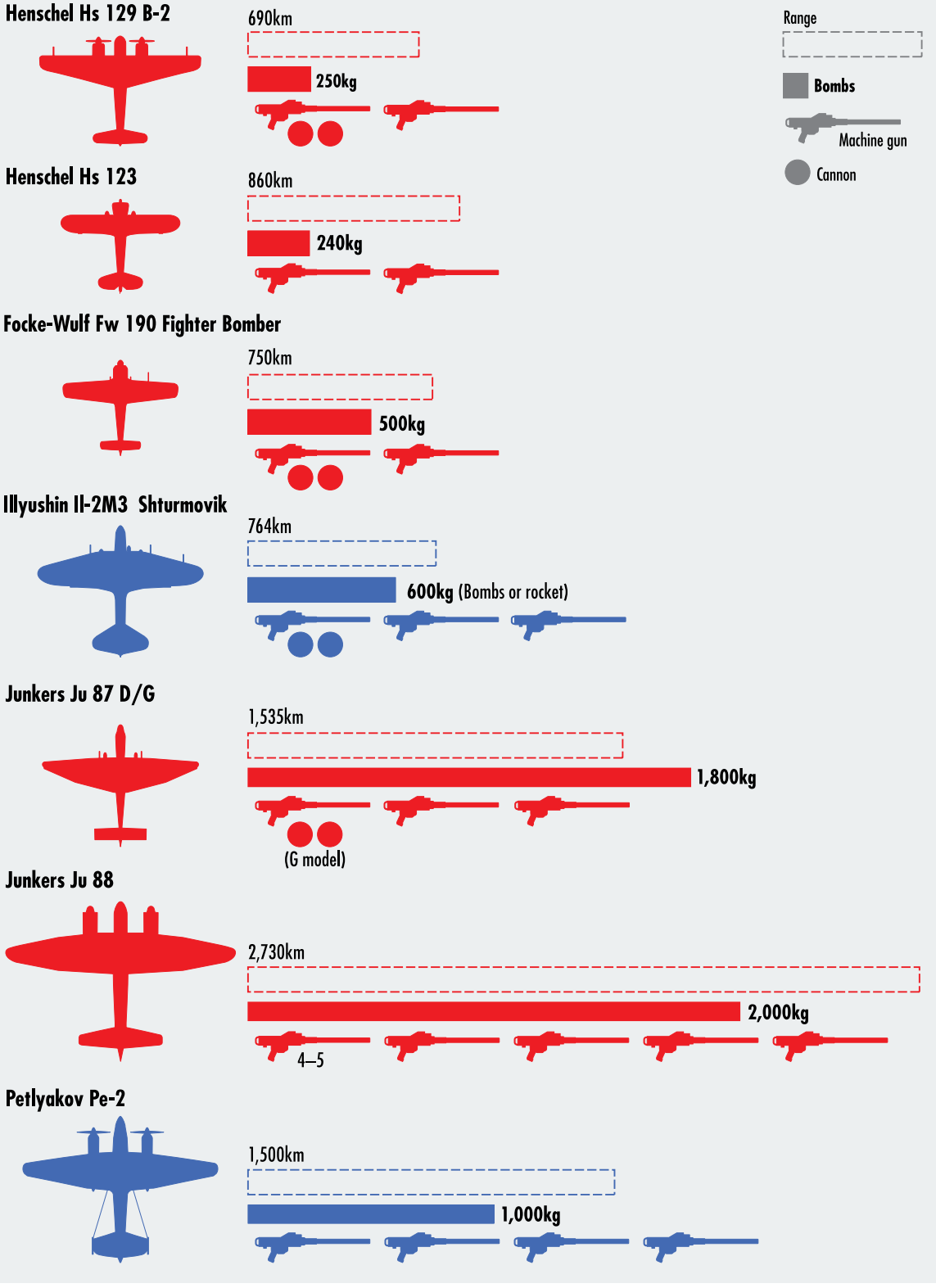


The Stuka was valued for its ability to accurately deliver bombs on target; the aircraft was slow and vulnerable to enemy fighters, but it continued to operate on the Eastern Front through mid-1943. *Zitadelle* saw the last massed use of Ju 87s to support a major offensive during the war. After Kursk, the Stuka dive-bombing force, along with *Schlacht* ground attack aircraft, were integrated into a new, unified organization. Stukas were increasingly replaced with Fw 190 fighter bombers, and the remaining Ju 87s used for night operations. (Nik Cornish at www.Stavka.photos)

bombers and a small number of the venerable Hs 123. The Hs 123 was an obsolete biplane but remained remarkably effective and popular on the Eastern Front. Before departing for Italy, the Luftwaffe's close support expert, Field Marshal von Richthofen, had even suggested that production of the "one-two-three" be restarted. The Fw 190 with its rugged construction proved to be an excellent fighter bomber. Its air-cooled radial engine, covered by an armored ring, was much more resistant to enemy ground fire than the Bf 109, small numbers of which had served during the early war years as fighter bombers, with its vulnerable liquid-cooled engine. The Fw 190s often dropped small SD 2 fragmentation bombs that were very effective against soft targets. German interest in a specialized ground attack aircraft had produced the Henschel Hs 129, a single-seat design with two 20mm cannon and two machine guns. At Kursk, most Hs 129s were fitted with a Mk 103 30mm cannon able to penetrate 80mm of armor with tungsten penetrator shells. The fuselage was heavily protected, but the Hs 129's two French Gnome-Rhône engines were unarmored and vulnerable. The engines were also underpowered and had difficulties dealing with the dust and dirt encountered on improvised airfields, making the aircraft an underperformer in the east. Seidemann had a specialized tank-hunting command at Kursk, "Pz. Jagd-Kdo/SchG 1" under Head of Panzerjäger Captain Bruno Meyer, which consolidated 79 Hs 129s from several squadrons under one command for tank hunting.

One of the best-known aspects of the Kursk air battle was the employment of the Ju 87 G with two 37mm cannon, famously flown by Stuka ace Hans-Ulrich Rudel. Searching for a better aerial capability to destroy enemy tanks, a special unit, *Versuchskommando für Panzerbekämpfung*, was established at Rechlin in Germany in late 1942 to experiment with new equipment. Two squadrons flew Ju 87s with 37mm cannon in underwing pods, each of the two with 12 tungsten armor-piercing rounds. An additional squadron experimented with a 37mm on Bf 110s, and another with Ju 88s carrying a large 75mm PAK 40 cannon. Of the three variants, only the Ju 87 was successful, and the squadrons were assigned one each to StG 1 and StG 2 in June 1943. Rudel, the Luftwaffe's leading tank-killing ace, would fly the Ju 87 G model with its 37mms, and end the conflict claiming to have personally destroyed 519 Soviet tanks. The Ju 87 G was even slower and more unwieldy than other models with the

Luftwaffe and VVS ground support aircraft capabilities



weight of the two cannons and was vulnerable to ground fire when attacking at low altitude. The Luftwaffe typically placed four G and eight D models in a squadron, and tactics called for the Ju 87 Ds to suppress Soviet antiaircraft fire with bomb attacks before the Gs flew in low to attack the T-34s from the side or rear.

Since the first months of the war in the east, Soviet aviation had dominated the hours of darkness, where it operated to avoid the deadly Luftwaffe fighters. Heavy losses to the Soviet Long Range Aviation (*Aviatsiya dal'nego deystviya* or ADD) bomber force during daylight operations in 1941 led to it being used almost exclusively for night operations for the remainder of the war. Also, the VVS air armies formed light night bomber regiments and divisions in 1941, putting their many obsolete U-2 and R-5 biplanes to use conducting harassment bombing missions, and continuing the practice throughout the war. The Luftwaffe initially dismissed the Soviet night attacks with their small fragmentation bombs, but as the conflict dragged on the Germans established their own, albeit smaller, force of night harassment bomber squadrons.

The units were first designated *Störkampfstaffeln* (Stork Squadrons) and later termed *Nachtschlacht-flieger-Verbände* (night ground attack units). The first improvised units were formed in 1942 by General Günther Korten, who would eventually be chief of the Luftwaffe General Staff (OKL), and ultimately killed in the July 20, 1944 bomb plot, when he commanded Luftwaffenkommando Don, the weak unit holding Army Group B's flank in 1942 during the Stalingrad campaign. The first two *Störkampfstaffeln* were formed with obsolete training and observation aircraft given minimal modifications such as the addition of bomb racks, including the Heinkel 46, Arado 66, Gotha 45, and Focke-Wulf 58. The units steadily expanded as the war increasingly turned against the Axis, and in 1944 began to

Focke-Wulf Fw 190s at an Eastern Front airfield in late 1942 or early 1943. The Fw 190 was initially deployed in the west, but increasing numbers of the Fw 190 fighter and fighter-bomber models joined the Luftwaffe in the east in 1943. Luftflotte 6 operated Fw 190-equipped *Jagdgeschwade*, while Luftflotte 4 flew late model Bf 109 G "Gustavs." Both types shot down large numbers of Soviet fighters and Shturmoviks during Operation *Zitadelle*. (Sobotta/ullstein bild via Getty Images)

Ground crews loading ammunition on a Bf 110 in 1943. The Luftwaffe was able to preposition adequate ammunition for *Zitadelle* but struggled to provide adequate fuel supplies for the offensive. Although the Bf 110 had difficulties performing its original role as a long-range bomber escort in the early years of the war, it proved a versatile aircraft, serving as a night fighter over the Reich and ground attack aircraft on the Eastern Front. (ullstein bild/ullstein bild via Getty Images)

operate Stukas and later even modern Fw 190s. During the Kursk campaign, the Luftwaffe's night harassment force was active, but consistently outflown by the more numerous Soviet ADD and VVS forces operating during the hours of darkness.

The Germans struggled to develop a night fighter capability to try and meet the Soviet ADD and harassment bomber threat. Some improvised efforts began in 1941 to exploit searchlights and moonlight but were largely unsuccessful. The Luftwaffe made major progress in establishing an effective night fighter force for the defense of the Reich after the RAF bombing of Lübeck in March 1942, but had none to spare for the Eastern Front. During the 1943 buildup for *Zitadelle*, the Soviet night bomber raids on the critical rail corridor through Orel were so severe that Goering authorized the transfer of a night fighter unit, IV/NJG 5, from East Prussia to the area. The unit had Ju 88 C-6 and Do 217 J and N night fighters with experienced crews, but had little success until the unit's train-mounted radars arrived in the middle of July, eliciting angry criticism by Luftflotte 6 chief von Greim after a heavy ADD bombing raid on the 12th. The arrival of the radars soon after dramatically increased their ability to intercept Soviet aircraft, and they downed several of the ADD's small force of Pe-8 four-engine bombers in late July. After the loss of 12 Soviet bombers on the night

of the 20th, the ADD discontinued operations over the Orel salient, helping the Germans conduct an orderly withdrawal in August.

The Luftwaffe flew a variety of capable support aircraft. By late 1942, it had begun to replace its vulnerable Hs 126s and many Fw 189 reconnaissance aircraft with Bf 109 and Bf 110 aircraft modified for recon missions. The Luftwaffe's primary transport remained the reliable Ju 52, which in addition to its more famous role early in the war dropping *Fallschirmjäger* paratroopers, was extensively used to fly supplies to Luftwaffe units, and from 1942 onwards, to try and resupply German forces encircled by Red Army offensives.

Aircrew quality

The decisive factor in the air battle at Kursk was the superior quality of Luftwaffe personnel. The German ranks had large numbers of pilots and aircrew with experience of multiple campaigns, often amounting to hundreds of operational sorties. The Luftwaffe did not typically rotate personnel from front-line duty and the fighter force favored tactics that allowed its premier aces to run up their scores, leading to some of the veterans racking up dozens and, ultimately, even hundreds of victories. Günther Rall ended the war claiming 275 enemy aircraft shot down, and Erich Hartmann 352. Although the Luftwaffe was beginning to shorten its training programs for new personnel, they still joined the force in 1943 much better prepared than their VVS opponents. Despite shortages of instructors – often pulled to the front in times of crisis – and fuel, trainees received 300 hours of flight training in 1942. The total decreased to 250 the next year, but it was still an order of magnitude superior to Soviet flight training.

Tactics

The Luftwaffe had begun the war with a decided tactical advantage over its opponents with their *Rotte-Schwarm* formation. The *Schwarm* (swarm) consisted of two *Rotten (packs),* each of which had a leader who engaged the target while a wingman provided cover. The rigid three-plan "vic" formations used by the RAF and VVS in the early years of the war were extremely vulnerable to slashing attacks from above by these two- and four-ship fighter formations. By 1943, the VVS had adopted the two-four plane technique, terming it the "*para-zvenno*" formation, although the inexperienced and poorly trained Soviet pilots struggled to employ it effectively at Kursk.

Close air support tactics, another area where the Luftwaffe had a major advantage in the early years of the war, were of primary importance at Kursk. Wolfram von Richthofen, initially dubious about their efficiency, became a convert while serving with the Condor Legion in Spain and was the leading proponent and practitioner when commander of VIII. Fliegerkorps, which became the preeminent Luftwaffe close support formation. Key to providing air support to the ground forces was the placement of the *flivos* air liaison officers with small staffs and communications equipment with all army and corps headquarters as well as all mechanized division and many regimental HQs. The *flivos* synchronized Luftwaffe with army plans, received requests for airstrikes, arranged for proper targeting, and passed them to the flying units. They also served to keep higher levels of Luftwaffe command constantly updated on the course of the ground battle. Airstrikes could arrive in as little as 20 minutes with this system. Some *flivos* had specialized vehicles to accompany advancing units and communicate directly with aircraft overhead in a similar fashion to the "cab rank" tactics used by the western Allies during the later years of the war. The Luftwaffe system was not perfect, however, and many units, including some spearhead Panzer formations, did not have such detachments and the ground troops had to fall back on the same flares, smoke cartridges, and visual panels used in 1941–42.

Hans Seidemann photographed before the war during his successful career as an air racer. Like many other Luftwaffe senior officers, Seidemann had trained in the USSR at the secret joint facility at Lipetsk in the late 1920s, after which he won notoriety as an air racer in the 1930s. Seidemann had served in the Mediterranean theater against the western Allies before taking over the command of VIII. Fliegerkorps from General Martin Fiebig. Seidemann remained in command of the Fliegerkorps until the end of the war. (Robert Sennecke/ullstein bild via Getty Images)

Basing and logistics

Due to the plan to mass almost 2,000 aircraft for *Zitadelle*, the Luftwaffe made extensive logistical preparations, pre-positioning supply points, aircraft recovery detachments, mobile field workshop battalions, airbase command staffs, airfield operations companies, and supply columns. Reich Labor Service Auxiliary Battalions of militarized civilian workers were added to support the buildup. New tactical and forward bases were built to accommodate operations by the large number of aircraft assigned to *Zitadelle*, many of which would only fly to their operational positions in the hours before the attack began. At Kursk, the Luftwaffe airfields were generally closer to the front line than those of the Soviets, allowing for more rapid response and more sorties per day.

By July 5, VIII. Fliegerkorps had managed to position adequate ammunition for roughly ten days of intensive operations, and 1. Flieger-Division had 15 days' worth of bombs and munitions. Fuel supplies were inadequate, however, and remained a check on operations as the battle for Kursk progressed. Overall, the Luftwaffe in the east estimated it required 350,000 tons a month but was only allocated a supply of 160,000. Partisan actions and night raids by Soviet Long Range Aviation (ADD) bombers against the rail net further complicated the supply of fuel. The partisans launched 841 sabotage attacks in June alone, attacking 44 bridges and, according to German reports, stopping rail movement at an average of 24 points a day. Due to shortages, Luftwaffe commanders had to use "fuel availability tactics", with some missions not flown in order to retain a fuel reserve for crises.

Leaders

Although Hitler's *Zitadelle* order demanded "the best commanders" for the operation, the Luftwaffe experienced command turbulence in the east in the months before A-Tag. Luftflotte 4 had been commanded since early 1942 by Wolfram von Richthofen, an aggressive and energetic officer expert in air support to ground operations. Luftwaffe Chief of Staff (OKL) General Hans Jeschonnek was anxious to obtain a field command after the pressure of dealing with Goering and Hitler for the first years of the war, and Goering considered replacing him with Richthofen. The latter, however, was wary of the toxic high command environment and secured the command of Luftflotte 2 in Italy instead. Jeschonnek was still slated to take over Luftflotte 4, but as he had no previous field command experience von Manstein insisted that commander of the 1st Flak Corps and Eastern Front veteran General Otto Dessloch serve as its acting commander for *Zitadelle*. Dessloch had flown in World War I and then fought with the irregular Freikorps in Bavaria. Like many Luftwaffe officers, Dessloch trained at the secret German-Soviet aviation facility in Lipetsk in 1926–27, and then joined the Luftwaffe during the rapid expansion during the 1930s. He commanded Flak units in the east for the first years of the war, in addition to several ad hoc commands including Luftwaffe Command Caucasus and Luftwaffe Command Kuban, in 1942–43. Jeschonnek, anxious to take over the promised position as Luftflotte 4's commander-in-chief, was on a familiarization visit to Dessloch's headquarters during the start of *Zitadelle*.

General Martin Fiebig had led VIII. Fliegerkorps into early 1943 but was transferred to the Balkans and replaced by General Hans Seidemann before *Zitadelle*. Seidemann had been

FAR LEFT
General Otto Dessloch was appointed acting commander of Luftflotte 4 at the insistence of Army Group South commander Marshal Erich von Manstein. Von Manstein did not want Luftwaffe Chief of Staff Hans Jeschonnek, who had never led an operational unit, to take command of the unit just before *Zitadelle*. Dessloch had previously served as the commander of the Luftflotte's subordinate Flak corps, and in 1942 led several ad hoc formations with both aircraft and Flak units. (Archive PL/Alamy Stock Photo)

LEFT
General Robert Ritter von Greim visiting a Flak antiaircraft unit in October 1943. Von Greim was a hard-fighting Luftwaffe leader who spent almost the entire war on the Eastern Front. After the failure of his Operation *Carmen* raids on the Kursk rail station, Greim launched a series of long-range strategic bombing raids on a tank production facility in Gorky, rubber plant in Yaroslavl, and refinery at Saratov. Von Greim led Luftflotte 6 until the last days of the war, when he briefly served as the Luftwaffe's second and last commander. (Roger-Viollet via Getty Images)

too young to serve in World War I but was also trained at the Lipetsk facility in the USSR in the 1920s and was a notable air racer during the 1930s, winning the London–Isle of Man race in 1937. In the Luftwaffe, Seidemann served as chief of staff to Richthofen when he commanded the Condor Legion in Spain in 1938–39. During the war, Seidemann served as Kesselring's chief of staff in the Mediterranean, and then took over Air Command Africa in August 1942. After the destruction of Axis forces in Tunisia, Seidemann was transferred to the Eastern Front, taking command of VIII. Fliegerkorps on May 19.

In Army Group Center, air support was provided by Luftflotte 6, designated Luftwaffenkommando Ost until early May 1943. General Robert Ritter von Greim had commanded the formation since 1942. Greim served as an artillery officer, aerial observer, and finally fighter pilot during World War I, ending the conflict as a squadron commander with 15 aerial victories. Greim was invited to China by Chiang Kai-shek in the 1920s to help build the air force there, then returned to the expanding Luftwaffe in the 1930s. He had led V. Fliegerkorps during the Battle of Britain, and in 1942 led Luftwaffenkommando Ost as it held against Soviet offensives in the north while Hitler launched Operation *Blau* towards Stalingrad and the Caucasus. Greim spent almost the entire war on the Eastern Front, and after flying into Berlin during the last days of the war was promoted to marshal by Hitler in the Führerbunker and made the second and last commander of the Luftwaffe. A true believer, Greim committed suicide, with a cyanide capsule possibly given to him by Hitler, a few days after his capture in 1945.

General Paul Deichmann commanded Greim's 1. Flieger-Division, the key Luftwaffe element supporting Army Group Center's 9th Army attack into the Kursk salient from the north. Deichmann had joined the army in 1916 as a cadet and, soon promoted to lieutenant, served as an aerial observer with the air force. After the war, he served in the Weimar army and joined the Luftwaffe in the 1930s. Deichmann served in a series of staff roles during the early years of the war, as chief of staff to the II. Fliegerkorps in 1940 and afterward to Luftflotte 2. After commanding the 1. Flieger-Division at Kursk, Deichmann led I. Fliegerkorps from 1943 to 1944. After the war, Deichmann was one of the former officers who drafted analyses of the air war for the US Air Force, notably authoring the volume on "German Air force Operations in Support of the Army."

Luftwaffe order of battle

Operation *Zitadelle* would see Luftflotte 6, supporting Army Group Center, and Luftflotte 4, supporting Army Group South. Luftflotten were army-level aviation formations with mixed aircraft types and controlling extensive support elements. Goering's Luftwaffe controlled German antiaircraft (Flak) resources, and each of the Luftflotten engaged at Kursk contained a Flak corps. The Luftwaffe concentrated roughly 1,830 of the 2,980 aircraft it had on the Eastern Front for *Zitadelle*, leaving few resources to screen the rest of the front. Luftflotte 1, which supported Army Group North, had one bomber and one fighter bomber *geschwader*, a light night-bomber formation, and a single *gruppe* of fighters. Greim's Luftflotte 6 covered its northern flank with a small force under 4. Flieger-Division, commanded by General Josef Punzert, which only had a single squadron of JG 54 fighters under command. Luftflotte 4 contained over 1,500 aircraft, but almost all of its combat assets were assembled under VIII. Fliegerkorps for *Zitadelle*, and Dessloch's I. and IV. Fliegerkorps covered the remaining portions of the front, which included the Donbas, Crimea, and Kuban peninsula with little more than their night harassment and reconnaissance units, along with a force of 95 Romanian aircraft.

Luftflotte 6 was commanded by General Robert Ritter von Greim and provided aviation support to Marshal Günther von Kluge's Army Group Center. Von Greim concentrated around 730 combat aircraft under General Paul Deichmann's 1. Flieger-Division to support Model's 9th Army as it launched the German attack on the northern portion of the Kursk salient. Deichmann's force included seven bomber groups (*Gruppen*), drawn from four bomber wings (*Kampfgeschwader*) – KG 1, 4, 51, and 53. 1. Flieger-Division contained two dive-bomber groups from *Stukageschwader* 1 (StG 1) and one from StG 3. For ground support, Deichmann had a *gruppe* of Bf 110 fighter bombers from *Zerstörergeschwader* 1 (ZG 1) and an additional 14 antitank Bf 110 aircraft in a *Panzerjägerstaffel* (tank-hunting squadron) under ZG 1. *Fliegergeschwader* 51 provided fighter support, and was present in full force, with three groups and an 18-plane squadron with Spanish pilots, all flying Fw 190 fighters. Also present was a single Fw 190 group from JG 54. A variety of units directly subordinate to Luftflotte 6 were available to support 1. Flieger-Division including a night fighter group, strategic reconnaissance aircraft, and a night harassment bomber group.

An Hs 123 ground attack aircraft at an airfield in the Kuban in August 1943. The Hs 123 was an obsolete light attack aircraft in 1943, armed with two 7.92mm machine guns and only able to carry a light bomb load, but it was reliable and rugged, and popular on the Eastern Front. Sixteen were part of *Schlachtgeschwader* 1 at Kursk. After *Zitadelle*, the remaining Hs 123s operated mostly at night. (Keystone-France/Gamma-Keystone via Getty Images)

The Luftwaffe still operated a number of Fw 189 "Uhl" (*Owl*) aircraft in their short-range reconnaissance groups, although the vulnerable aircraft was being steadily replaced by Bf 109 fighters modified to serve in the recon role. Luftwaffe strategic reconnaissance units flew modified Ju 88, Do 217, and He 111 bombers for their longer-range missions. (Nik Cornish at www.Stavka.photos)

General Otto Dessloch's Luftflotte 4 supported von Manstein's Army Group South. Dessloch assigned VIII. Fliegerkorps, commanded by General Hans Seidemann, to control all Luftwaffe support to the attack against the southern portion of the salient by the 4th Panzer Army and Army Detachment Kempf. Seidemann's VIII. Fliegerkorps was the Luftwaffe's preeminent close air support organization and contained 1,100 aircraft for *Zitadelle*. The formation had eight groups of bombers drawn from four *Kampfgeschwader* (KG): 3, 27, 55, and 100. Two of the groups were equipped with Ju 88s, the other six with He 111s. VIII. FK controlled two full Stuka *Geschwaders*, StG 2 and StG 77, with a total of six Stuka groups. Seidemann also had under his command Ground Attack (*Schlachtgeschwader*) SG 1 with two Hs 123A and Fw 190 F fighter bomber groups and four Hs 129 B squadrons gathered into a specialized unit under Hauptmann Meyer, along with one Ju 87 G antitank squadron. Fighter support came from JG 3 and JG 52, with five Bf 109 groups between them. Luftflotte 4 could also send Seidemann support as needed from its night bomber group with old biplanes and several Bf 109 and Fw 189 reconnaissance squadrons, and the Hungarian Air Division with one group each of Bf 109s and Ju 87s, and two Ju 88 and one Fw 189 squadron.

ORDER OF BATTLE

ARMY GROUP CENTER
Luftflotte 6 (Generaloberst Robert Ritter von Greim)
1. Flieger-Division (Generalmajor Paul Deichmann)
Bombers
III./KG 1 (Ju 88)
Stab., II, III/KG 51 (Ju 88)
Stab., II, III/KG 4 (He 111)
Stab., I, III/KG 53 (He 111)
Dive bombers
Stab., I, II, III/StG 1 (Ju 87)
III/StG 3 (Ju 87)
Zerstörer
Stab, 1./ZG 1 (Bf 110)
Panzerjägerstaffel/ZG 1 (Bf 110)
Fighters
Stab., I, III, IV/JG 51 (Fw 190)
15.(Span)/JG 51 (Fw 190)
I./JG 54 (F2 190)
Reconnaissance
Stab., 1, 2, 3/NAGr 4 (Bf 109)

1. Flieger-Division, July 4, 1943			
Type	Model	Order of battle	Number of groups
Fighter	Fw 190	186	4
Bomber	Ju 88 (92), He 111(152)	244	7 (3 Ju 88, 4 He 111)
Dive bomber	Ju 87	159	4
Destroyer/Ground attack	Bf 110	58	1
Reconnaissance fighter	Bf 109	39	
Total		686	20

1. Flieger-Division Order of Battle notes

- Stab. represents group headquarters staff elements, which typically contained several combat aircraft.
- Fw 190 fighters were predominantly A-4 and A-5 models, with a few A-2s and A-3s; Ju 88 bombers were A-4, A-14, C-4, and C-6; He 111 bombers were H-6, H-11, H-14, and H-16; Ju 87s D-1 and D-3. There were 11 Ju 87 G models in StG 1.
- 1. Flieger-Division controlled three short-range reconnaissance squadrons (NAGr). The Bf 109 G-3 and G-4 reconnaissance fighters from NAGr 4 (Short Range Reconnaissance *Gruppe*), attached to the 9th Army, are included in the table, as they participated in air-to-air combat at Kursk; Hs 126 and Fw 189 reconnaissance aircraft of NAGr 10, attached to the 2nd Panzer Army, are often included in I. Fliegerkorps' overall aircraft count, bringing it to almost 730 aircraft.
- A variety of units directly subordinate to Luftflotte 6 were available to support 1. Flieger-Division, including IV/NJG 5 with 42 Ju 88, Bf 110, and Do 217 night fighters; FAGr 2 with Ju 88, He 111, Do 217, Ju 86, and Ar 240 strategic reconnaissance aircraft; and Storkampfgruppe Luftflotte 6 with a variety of Ar 66, He 46, Go 145, and Fw 58 night harassment bombers. Luftflotte 6 also contained Ju 52 transports and other utility aircraft.

ARMY GROUP SOUTH
Luftflotte 4 (General der Flieger Otto Dessloch)
VIII. Fliegerkorps (Generalmajor Hans Seidemann)
Bombers
Stab., I, II/KG 3 (Ju 88)
Stab., I, II, III/KG 27 (He 111)
14.(Eis.)/KG 27 (He 111)
Stab., II, III/KG 55 (He 111)
14.(Eis)/KG 55 (He 111)
I./KG 100 (He 111)
Dive bombers
Stab., I, II, III/StG 2 (Ju 87)
Panzerjägerstaffel/StG 2 (Ju 87)
Stab., I, II, III/StG 77 (Ju 87)
***Schlacht* (attack)**
Stab., I, II/ShG 1(Fw 190, Hs 123)
Pz. Jagd-Kdo/SchG 1(*Führer der Panzerjäger*) (Hs 129)
4., 8.(Pz)/SchG 1 (Hs 129)
4., 8.(Pz)/SchG 2 (Hs 129)
Panzerjägerstaffel/JG 51 (Hs 129)
Fighters
Stab., I, II, III/JG 52 (Bf 109)
III./JG 3 (Bf 109)
Hungarian 1. *tavolfederito osztaly*
Hungarian units subordinate to VIII. Fliegerkorps included 30 bombers, 30 fighters, 12 ground attack aircraft, and 18 reconnaissance aircraft.

VIII. Fliegerkorps, July 4, 1943			
Type	Model	Order of Battle	Number of groups
Fighter	Bf 109	196	5
Bomber	Ju 88 (72), He 111 (221)	292	8 (2 Ju 88, 6 He 111)
Dive bomber	Ju 87	242	6 (Ju 87)
Ground attack	Hs 123, Hs 129, Fw 190 FB	184	2 (Fw 190, Hs 123) + Pz.Jagd-Kdo/ Schl 1 (Hs 129)
Total		914	

2.VIII. Fliegerkorps Order of Battle notes

- Bf 109 fighters were G-4 and G-6 models; Ju 88 bombers A-4 and C-6 models; He 111 bombers H-6, H-11, H-14, and H-16 models; Ju 87s D-1, D-3, and D-5 models.
- Hs 126, Fw 189, Bf 109, Bf 110 reconnaissance aircraft of NAGr 6, are often added to the VIII. Fliegerkorps' total aircraft count, increasing it to almost 1,100.
- A variety of units directly subordinate to Luftflotte 4 were available to support VIII. Fliegerkorps, including 12 night reconnaissance Do 217 and He 111 aircraft, five long-range reconnaissance squadrons with a total of 37 Ju 88s, and Storkampfgruppe Luftflotte 4 with a variety of He 46, Ar 66, Do 17, Hs 126, Ar 66, Fw 189, Ju W 4, Go 145, Ju 87, and Fw 58 night harassment bombers. Luftflotte 4 also contained Ju 52 transports and other utility aircraft.

DEFENDER'S CAPABILITIES

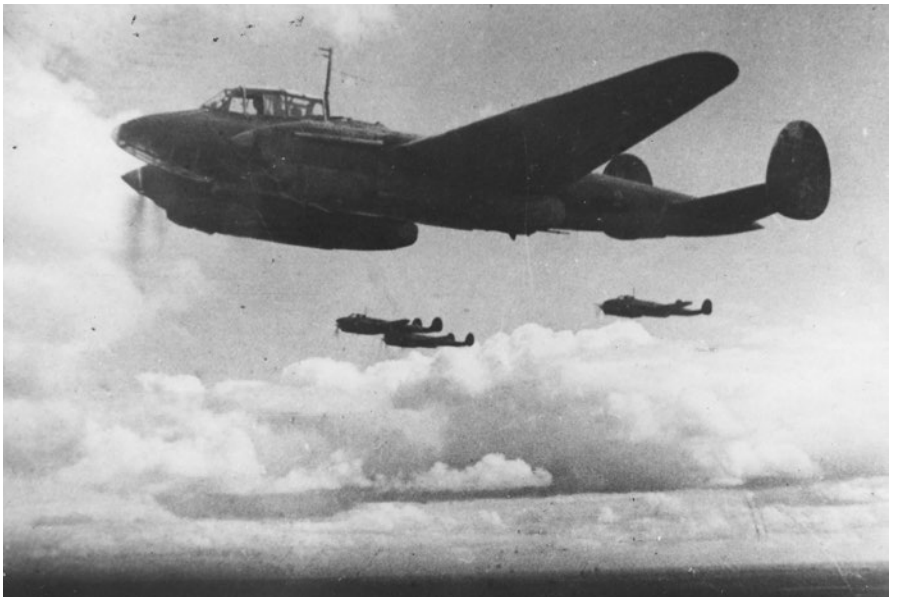
The VVS battles back

Il-2 Shturmoviks operating in the Leningrad area in 1943. The Il-2 was the most-produced aircraft of the war, with 36,000 of all models leaving the factories and over 10,000 lost in action. The Il-2s were equipped with new PTAB antitank bombs just before Kursk, but lack of training and intense German fighter and Flak defenses limited their usefulness during *Zitadelle*. (russianphoto/ CC-BY-4.0)

After fighting the Luftwaffe to a standstill over the Kuban, the VVS steeled itself to challenge the Germans for air superiority over the Kursk salient. The battle to gain the initiative, however, would prove extraordinarily costly, as pilot-for-pilot, plane-for-plane and unit-for-unit the German air force retained major qualitative advantages over the VVS. Only a series of costly, unrelenting offensives by the Soviet airmen beginning in August would ultimately turn the tide.

In 1943, Soviet production gave the VVS a decided numerical advantage over the Luftwaffe, with over 8,000 combat aircraft at the front facing just under 3,000 German. The VVS had suffered crushing losses – as many as 20,000 aircraft – in 1941 and continued to sustain heavy losses in 1942, but could rely on its aircraft production infrastructure, evacuated to the Urals in 1941 before it could be overrun by the Wehrmacht advance, to replace losses. To keep production numbers high, the assembly process was ruthlessly simplified and focused mainly on single-engine fighters and Shturmovik Il-2 ground attack aircraft. Only 14 percent of the aircraft produced by the USSR in 1942–43 were multi-engine models. Soviet aircraft production was supplemented by lend-lease bombers and fighters, with the A-20 Boston light bomber being the most prominent at Kursk.

The USSR increased the number of aircraft produced each month from 2,100 to 2,900 in 1942, and by the summer of 1943, the VVS was able to reequip its regiments with proven models including Yak-1s and Yak-7Bs, along with the newer Yak-9 and La-5. Less capable LaGG-3s, MiG-3s, Hurricanes, and Tomahawks were no longer used in the front-line units. Most Il-2 Shturmovik ground assault aircraft were Il-2m3 models with a rear cockpit gunner, although some of the extremely vulnerable single-seaters were still in the force. The primitive conditions and high production quotas in the factories led to a significant number of quality control issues and losses from crashes and accidents. Notably, an unauthorized camouflage paint used in June 1943 reacted with the glue on the wings of Yak-9s and Il-2s, leading a number to shed their skins in flight. Angered by the problems, Stalin ordered new repair and maintenance brigades to the front before *Zitadelle*, with the first battalion reaching Rudenko's 16th Air Army on June 6 to begin inspection and repair operations.



A formation of Pe-2 "Peshka" light bombers in formation. Soviet doctrine for an "air offensive" called for its Il-2 Shturmovik and Pe-2 and Boston bombers to serve as long-range artillery, executing pre-planned strikes as part of a Front offensive to penetrate German defenses. After the German defenses were shattered by artillery and airstrikes, Il-2 Shturmovik units covered by fighters would patrol ahead and protect the flanks of Soviet exploiting mechanized units. The VVS's rigid, top-down planning culture worked better in offensive operations, but had difficulties conducting defensive operations during the battle of Kursk. (Courtesy of the Central Museum of the Armed Forces, Moscow via Stavka)

Novikov had implemented new organizational structures for the VVS in early 1942 that proved their worth during the winter Stalingrad campaign. Air units that were previously spread among each front's ground force armies were now centralized in an air army (*vozdushnaya armiya* or VA) under a single VVS commander who reported directly to the front commander. Within the VAs, fighters, Shturmoviks, and light bombers were organized into homogeneous divisions, with two such divisions typically in a fighter corps (IAK), ground attack corps (ShAK), or bomber corps (BAK). Several "composite" or "mixed" (SAK) corps were engaged at Kursk with mixes of divisional types under command. Divisions were usually of one type – fighter, Il-2 ground assault, day bomber, or night bomber – and consisted of

two-to-five regiments. Typical full-strength regiments contained two headquarters aircraft and three ten-aircraft squadrons for a total of 32. By 1943, an average Soviet air army was 400–500 aircraft strong, although the 2nd, 16th, and 17th Air Armies engaged at Kursk had been reinforced by additional air corps sent from the high command reserve and had higher strengths when *Zitadelle* began.

The Soviet force intended for operational and strategic bombing operations, Long Range Aviation (ADD), had suffered heavy losses in 1941 during daylight bombing missions, and had soon been confined to night raids. In March 1942, ADD was directly subordinated to the Stavka high command, and in April 1943, reorganized from 11 separate divisions into eight bomber corps of two divisions each. By July, ADD operated roughly 700 bombers, mostly Il-4 mediums and a very small number of four-engine Pe-8s, and about 500 operated in the Kursk area. Apart from occasional small-scale raids on German cities intended to raise the morale of the Soviet population, ADD missions were closely linked with ground operations. Most of its raids were against German rail communications or other targets close behind the front line.

Soviet aviation doctrine

Although the Soviets frequently used the term "air superiority" to describe the aim of their operations, their way of war was heavily focused on support to ground operations. Air superiority missions were to protect friendly ground forces from Luftwaffe air attack and ensure that VVS aircraft could effectively deliver strikes on enemy forces. Close air support in 1941 and 1942 was usually used to strike targets at least 3km behind the front line to avoid hitting friendly forces, with the VVS effectively operating as long-range artillery. At Kursk, the VVS conducted many strikes closer to the front. The Soviet command structure relied on centralized, detailed planning before operations and rigid execution of orders. At Kursk, with Soviet forces in a defensive posture, this command style was unable to cope with the dynamic environment and fog of war, and the VVS air armies were unable to implement their detailed pre-battle plans.

The Soviet command style proved more effective during offensive operations. When an air army supported a major assault by its front, executing what was termed an "air offensive," its aircraft would execute a wide spectrum of carefully pre-planned and orchestrated missions. Fighter units would cover the deployment of Soviet ground elements and their preparations for the assault; reconnaissance would map enemy positions; when the offensive began, VVS bombers and Il-2s would launch a series of pre-planned strikes against identified targets beyond the range of the frontal artillery barrage, serving as super long-range artillery; VVS fighters covered the strike aircraft on their missions. As part of an air offensive, Long Range Aviation (ADD) bombers would often attack line-of-communication targets close to the battle zone the night before the offensive began. When the front was broken, Il-2s with fighter escorts would screen the flanks and strike targets in front of the penetrating Soviet tank corps and armies. The VVS did conduct attacks on enemy airfields and free-hunting fighter patrols, but on a much smaller scale than other missions directly tied to supporting the front's attack.

The aircraft

Luftwaffe pilots repeatedly reported shooting down "LaGG-3s" during *Zitadelle*, but the completely outclassed VVS fighters of the earlier years of the war had been almost totally replaced and the VVS was now equipped with Yak-1s, Yak-7Bs, Yak-9s, and La-5s. Lend-lease fighter aircraft were not prominent at Kursk apart from a few regiments flying the US P-39 Airacobra, which was very popular in Soviet service. In addition, some of the newest

OPPOSITE
The VVS fighter force was heavily engaged at Kursk and suffered the bulk of the air-to-air combat losses during *Zitadelle*. The Yak-9 was a relatively modern fighter, but still outclassed by the latest models of Bf 109 G and Fw 190 A Luftwaffe fighters, particularly when inexperienced Soviets faced veteran German pilots. The La-5FN, just joining the force at the time of Kursk, had a more powerful engine that allowed it to meet the latest models of German fighters on equal terms. (Courtesy of the Central Museum of the Armed Forces, Moscow via Stavka)

fighter models, the Yak-9 and La-5FN, were with the force. Despite this modernization, the majority of the VVS fighter force was still roughly one year behind its opponents. The Yak-1 and Yak-7B could match the Bf 109 E and F versions of 1941–42, but the newer Bf 109 G-4 and G-6 versions with their more powerful engines and armament were superior. Even the new Yak-9, just entering service at Kursk, had difficulties battling the latest Bf 109 and Fw 190 versions. Only the La-5FN with its ASh-82FN 1,470hp engine was faster than both the German fighters, and more maneuverable than the Fw 190.

For ground attack missions the VVS flew the legendary Il-2 Shturmovik. Il-2s had heavy armor around the cockpit and fuel tanks, but the original single-seat version had proven extremely vulnerable to German fighter attack. At Kursk, most Il-2s were newer models, with a rear gunner firing a 12.7mm machine gun and the more advanced and reliable AM-38F engine. The Soviets rushed supplies of the new PTAB (*Protivotankovyye Aviabombyy*) antitank bombs to the Il-2 regiments to be used for the first time at Kursk. The PTAB weighed 2.5kg, with a 1.5kg shaped-charge warhead designed to penetrate the weaker upper armor of enemy tanks. The Shturmoviks could carry 192 PTABs in four cartridges or up to 220 in four bomb racks, and when released from 200m could cover cover over 3,000sq m with bomblets.

The bomber divisions flew Pe-2 "Peshkas" or A-20 Bostons. The lend-lease Bostons were designated B-3s in Soviet service. Both were capable light bombers, and the versatile Pe-2 could serve in both level- and dive-bombing roles, and was also used as a reconnaissance or fighter aircraft. The bomber divisions employed at Kursk were used less extensively than the Il-2 ground attack regiments and suffered fewer losses, but the 16th Air Army mounted several effective massed bomber raids on the German 9th Army during the battle. Long Range Aviation (ADD) flew Il-4 medium bombers, along with very small numbers of Pe-8 four-engine bombers on its night missions. The VVS employed its large force of obsolete biplane bombers, largely U-2s (later designated Po-2s) along with smaller numbers of R-5s and R-Zs, for night harassment missions. The VVS typically used modified bombers for reconnaissance sweeps. It used the Li-2, a license-built version of the US C-47 Dakota, for transport missions. The Li-2 could also be modified to serve along with the ADD in the bomber role.

The Yak-9, an improved version of the Yak-7b, was one of the modern VVS fighters at Kursk, although it also struggled to match the most recent German Bf 109 G and Fw 190 A models. One variant carried a 37mm cannon firing through the nose, giving an improved capability against ground targets. (© Corbis via Getty Images)

The Soviets used license-built copies of the American C-47 as a general-purpose and VIP transport aircraft. Some Li-2s were modified to deliver bombs and augmented the Long Range Aviation (ADD) force's Il-4 medium and Pe-8 four-engine bombers. (From the fonds of the RGAKFD in Krasnogorsk via Stavka)

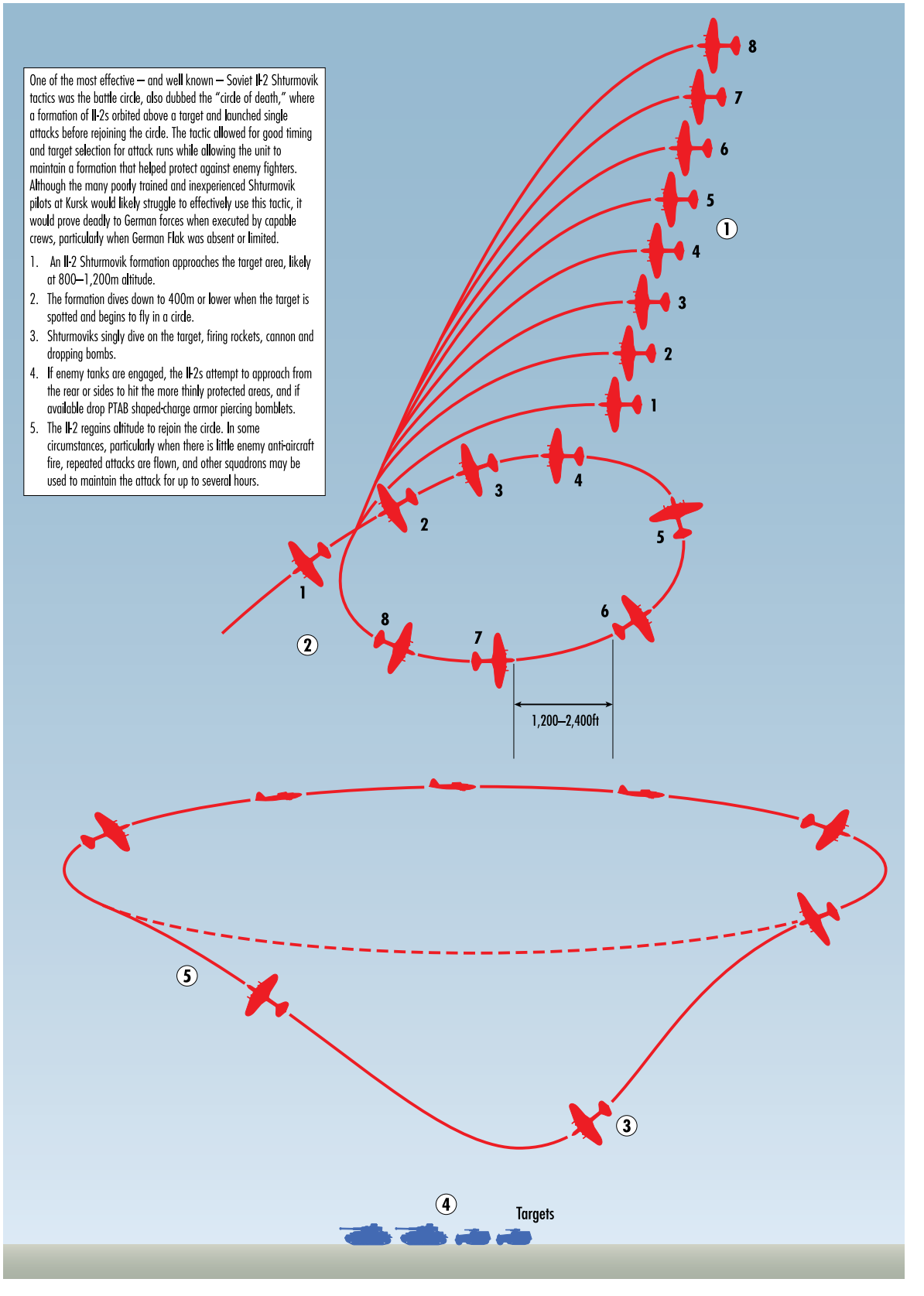
Aircrew quality and training

The critical weaknesses of the VVS at Kursk were the poor training and inexperience of many of its pilots and aircrews, and as a result the force was largely unable to employ the improved aerial tactics developed during the Stalingrad and Kuban campaigns. The Soviet training establishment operated roughly 6,000 aircraft throughout the war, many of them worn-out U-2s, but instructors and fuel were in short supply. The flight training programs were cursory, with little or no gunnery or aerial maneuver training, with the latter banned in some programs to avoid accidents. Training flights were short, often 15 minutes or less, and focused on take-offs and landings. At other times trainees were used as utility pilots to ferry aircraft to increase flight hours. As a result, new pilots, dubbed "foals" in the VVS, could arrive at front-line units with as few as three to 20 hours of flight time in their logbooks, rarely in the aircraft type they were expected to fly in combat. In 1942, 14,700 Soviet aircraft, along with many pilots and aircrew, were lost in action, and the training system struggled to produce enough pilots to keep units up to strength.

The low priority of student pilots for rations underscores the Soviet training system's shortfalls. Many of the "foal" pilots arrived at their new units poorly nourished, adding to the burden the replacements put on the already stressed combat units. The regiments often had to literally fatten up the replacements before they could be sent aloft for remedial navigation, formation flying, and gunnery training. The heavy losses of 1942 and winter 1943 resulted in a large portion of the Soviet aircrew at Kursk being inexperienced trainees. Only seven percent of the Il-2 pilots of the three armies had any combat experience before *Zitadelle*, and roughly 50 percent of Rudenko's 16th Air Army were "foals." At Kursk, these poorly trained and inexperienced airmen would face veteran Luftwaffe pilots with many hundreds of combat sorties and often dozens of air-to-air victories to their credit.

One of the most effective – and well known – Soviet Il-2 Shturmovik tactics was the battle circle, also dubbed the "circle of death," where a formation of Il-2s orbited above a target and launched single attacks before rejoining the circle. The tactic allowed for good timing and target selection for attack runs while allowing the unit to maintain a formation that helped protect against enemy fighters. Although the many poorly trained and inexperienced Shturmovik pilots at Kursk would likely struggle to effectively use this tactic, it would prove deadly to German forces when executed by capable crews, particularly when German Flak was absent or limited.

1. An Il-2 Shturmovik formation approaches the target area, likely at 800–1,200m altitude.
2. The formation dives down to 400m or lower when the target is spotted and begins to fly in a circle.
3. Shturmoviks singly dive on the target, firing rockets, cannon and dropping bombs.
4. If enemy tanks are engaged, the Il-2s attempt to approach from the rear or sides to hit the more thinly protected areas, and if available drop PTAB shaped-charge armor piercing bomblets.
5. The Il-2 regains altitude to rejoin the circle. In some circumstances, particularly when there is little enemy anti-aircraft fire, repeated attacks are flown, and other squadrons may be used to maintain the attack for up to several hours.



OPPOSITE SOVIET IL-2 SHTURMOVIK CIRCLE ATTACK TACTICS

Tactics

Due to the inexperience of its pilot force, the VVS units at Kursk struggled to employ the advanced tactics that had been developed in 1942 and early 1943 at Stalingrad and over the Kuban. Like the RAF, VVS fighter units entered the war relying on the three-plane "vic" formation, leading to massive losses at the hands of the Luftwaffe with their flexible lead-and-wingman *rotte* and *schwarm* (two- and four-ship) tactics. The lack of radios in most early Soviet aircraft further inhibited flexible operations. By late 1942, the VVS began to adopt the same two- and four-ship tactics, termed "*para*" and "*zveno*," and most Soviet aircraft were radio-equipped. During spring fighting over the Kuban peninsula, the VVS developed the "Kuban bookcase," with *zvenos* flying at various altitudes to be able to provide overwatch when engaging the enemy, and not ceding the height advantage to the experienced Luftwaffe fighter pilots. The air armies at Kursk had too many inexperienced pilots, however, to implement these tactics, and VVS aircraft typically flew with fighters and Il-2s in a tight formation at a single altitude, highly vulnerable to enemy diving attacks.

The VVS relied on its Il-2 Shturmoviks as its primary ground attack aircraft. Although the pilot and engine were armored, Il-2s were vulnerable to fighter attack and, if they reached the target area, to ground fire due to the need to attack at low altitudes to deliver their bombs or PTABs, fire their rockets, or engage with cannon fire. As the war progressed, Il-2 units attempted to near the target at a slightly higher altitude, and then turn and execute a shallow 30-degree dive on the objective. The Il-2s flew in groups of four to 12 aircraft, and the air army commanders at Kursk tried to mass larger formations after their first piecemeal attacks led to high losses. When possible, Il-2 units operated over the target in a defensive circle, with each aircraft able to cover the one ahead, and Shturmoviks singly breaking off to dive on and engage the target in turn and then return.

The light bomber divisions had typically operated in small formations and attacked targets farther behind the forward Red Army positions to minimize hitting their own troops, but at Kursk were employed in several massed strike operations of at least divisional strength. The pressures of the battle also led to some attacks delivered relatively close to the front. The bomber divisions were used sparingly during the battle and suffered fewer losses than the Il-2 and fighter units.

Command and control

VVS operations during the battle for Kursk were hamstrung by command-and-control deficiencies. During the battle for Stalingrad and at the Kuban, VVS air armies had employed networks of radio guidance and control stations to maintain situational awareness over the battlespace and assist in the control of Soviet air operations. Similar networks set up by the air armies in the Kursk salient could cope with the low level of activity during the months before the offensive but were overwhelmed by the intense aerial action that began on July 5. The disposition of the 16th Air Army's control posts was poor, with most located too far from the front line and worse, in the 2nd Air Army, the radio equipment at two of the stations located along the most important axis of enemy offensive activities was in disrepair. Furthermore, Soviet radio discipline and procedures at Kursk were poor, with multiple stations attempting to use single frequencies.

Effective close air support was also hindered by a lack of VVS liaison officers with ground force headquarters. Unlike the Luftwaffe, which had *flivos* permanently assigned with most ground force units down to division and often regimental level, the VVS in the summer

Soviet aircrew planning a mission. The VVS faced shortfalls at every level of command at Kursk, limiting the impact of their close support sorties and increasing their losses to the more experienced Luftwaffe fighter squadrons. VVS Commander-in-Chief Aleksandr Novikov's analysis of the first days of the battle criticized commanders for focusing on being able to report high sortie numbers rather than conducting the needed mission planning. (Courtesy of the Central Museum of the Armed Forces, Moscow via Stavka)

of 1943 relied on pre-offensive planning meetings between air and ground officers to draw up detailed plans for operations. Although the VVS air army headquarters were typically co-located with the front's HQ, the 2nd Air Army failed to attach air liaison officers to many of the relevant subordinate army headquarters and failed to establish reliable radio communications with those in position. The situation was somewhat better in the 16th VA, with General Mikhail Kosykh, Rudenko's deputy commander, dispatched to the 13th Army, the formation directly in the path of the enemy offensive. Kosykh was empowered to directly order 16th VA aircraft at their bases into action. As a result of the shortcomings of the radio control network and limited air-ground liaison relationships, command and control of air operations at Kursk initially devolved to VVS army headquarters located 50–60km from the front line. Commanders at these posts had to base decisions on out-of-date information passed by pilots in the air or various ground elements.

Basing and logistics

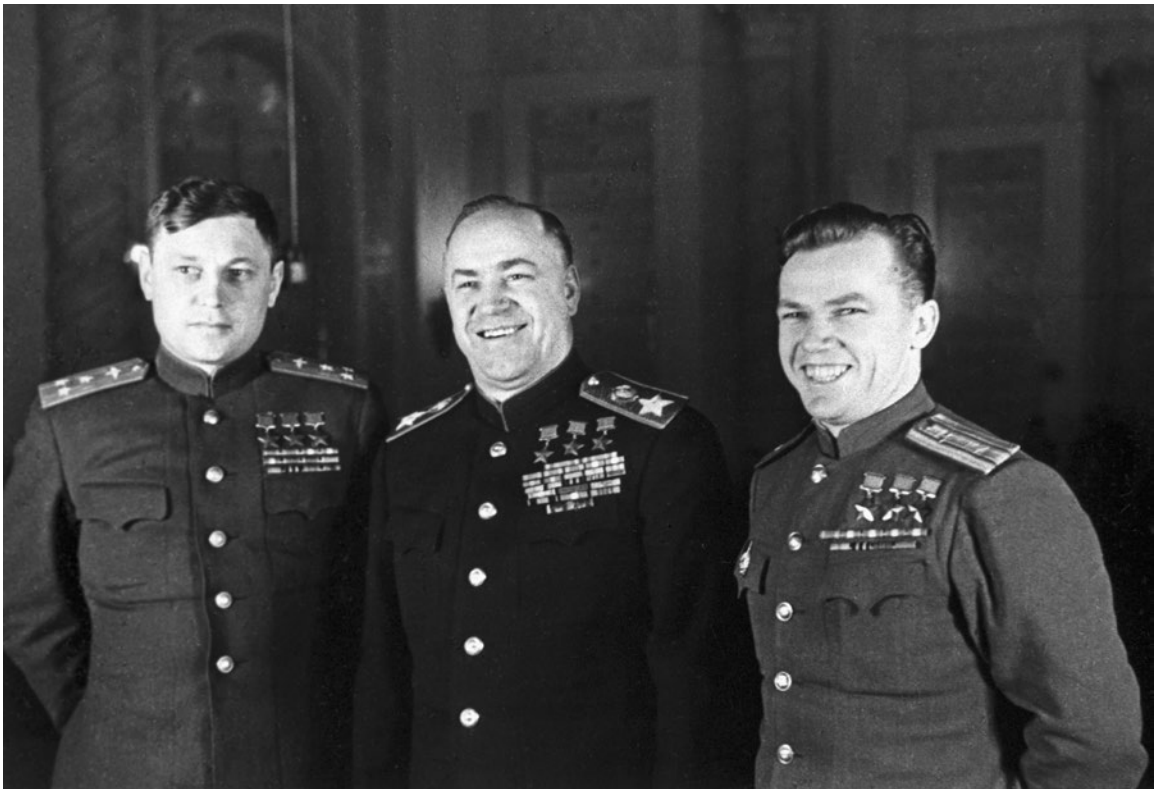
The Soviet airfield-servicing battalions established or refurbished 154 airfields although they were farther from the front than the Luftwaffe's. The Germans had fighter bases 18–30km from the battle zone and landing strips 5–6km from the front, while the VVS's were as far as 50–60km behind the front. The Red Army placed a great emphasis on *maskirovka* deception activities, and 50 dummy airfields were built, 17 in the 2nd VA's area alone, with 158 dummy aircraft emplaced and "normal" airfield operations simulated by small staffs. At the same time, extensive camouflage activities at operational bases hindered German efforts to track the true Soviet order of battle, and interception of Luftwaffe radio traffic revealed some VVS airfields were never identified by enemy reconnaissance. Despite a measure of Luftwaffe activity against the Soviet rail net, the Soviets were able to comprehensively prepare their air units with ammunition and fuel to meet the impending German offensive. Each airfield had a nine-to-15-day supply of fuel and ammunition prepositioned, and the new 2.5kg PTAB hollow-charge antitank bombers were rushed to Il-2 regiments just before the start of *Zitadelle*.

Leaders

At the highest levels, Soviet dictator Josef Stalin presided over the high command and at times intervened in operational or tactical issues, although by 1943, much less frequently than Hitler. Marshal Georgy Zhukov, Moscow's leading military commander, was sent to the Kursk area before *Zitadelle* to coordinate the operations of the three fronts that would ultimately attack the German-held Orel salient. The northern portion of the Kursk salient was held by General Konstantin Rokossovky's Central Front; and the Voronezh Front, under General Nikolai Vatutin, defended to the south. Both had command authority over the 16th and 2nd Air Armies that respectively supported their fronts.

The VVS Commander-in-Chief, General Aleksandr Novikov, had purview over administration, training, and doctrine for the air force, and at times coordinated the operations of multiple air armies at key areas of the front. Novikov had become commander of the VVS in early 1942, and made great strides in improving its tactics, command and control, and organization. At Stalingrad, Novikov had relocated his headquarters to the embattled city, and helped plan and coordinate the multi-air army defensive and counteroffensive operation. Similarly, in May Novikov set up headquarters in the Kursk area to coordinate the operations of the 2nd, 16th, and 17th Air Armies. He brought with him two deputies, General Grigory Vorozheikin, first deputy commander, and former 1st Air Army commander General Sergei Khudyakov, the VVS Chief of Staff, to assist. Novikov would also help coordinate the operations of the Soviet Long Range Aviation (ADD) bomber force, commanded by General-Major Aleksandr Golovanov, formally a separate aviation force directly controlled by the Stavka. Immediately after the war Novikov, Vorozheikin, and Khudyakov would fall from favor with Stalin, with the first two arrested and Khudyakov executed. Golovanov retained Stalin's favor – the beginning of *Zitadelle* on July 5 actually found him visiting the dictator's dacha near Moscow rather than at the front – and remained in command positions until Stalin's death in 1953.

A Yak-9 being refueled; the VVS was able to make comprehensive logistical preparations for the air battle at Kursk. Due to heavy losses to their fighter force, Il-2 and light bomber units flew fewer sorties than planned, and there was never pressure on their ammunition or fuel supplies. After the costly and ineffective first attempt by the 2nd and 17th Air Armies to strike VIII. Fliegerkorps airbases on July 5, neither side conducted more than a handful of raids on enemy airfields, allowing the logistics and maintenance networks to function with little interruption. (Sovfoto/Universal Images Group via Getty Images)



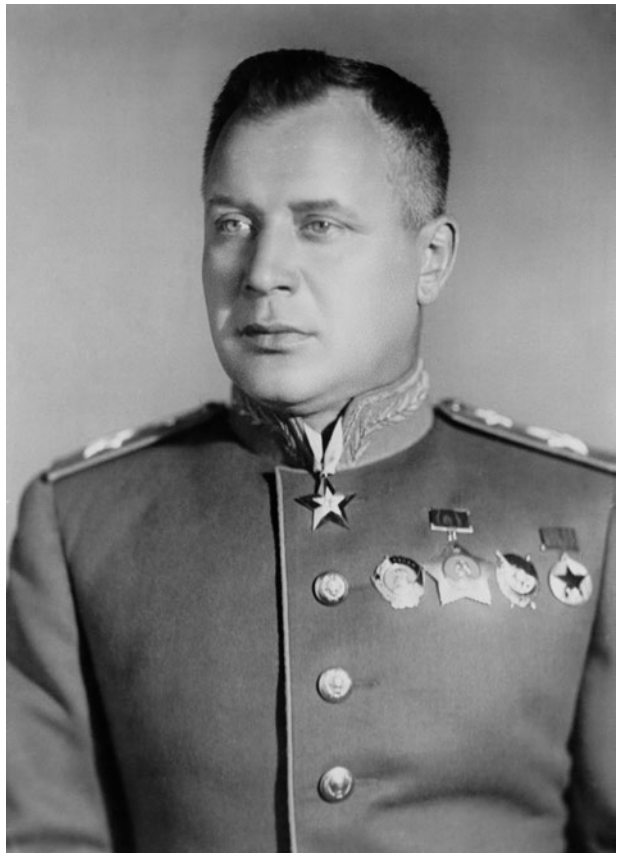
Marshal Georgy Zhukov, center, served as the representative of the Soviet General Staff – and Josef Stalin – to coordinate the overall defense of the Kursk salient and subsequent Operation *Kutusov* counteroffensive. He is shown here in 1945 with the USSR's two highest-scoring wartime aces, Alexander Pokryshkin on the left and Ivan Kozhedub on the right. Pokryshkin was posted to the south during Kursk, but Kozhedub, after spending the first period of the war as a flight instructor, was active during *Zitadelle*, scoring his first aerial victories during the battle. (Sovfoto/Universal Images Group via Getty Images)

The air armies supporting the fronts defending the salient were commanded by experienced leaders, although both struggled during the battle for Kursk. General Sergei Rudenko commanded the Central Front's 16th Air Army. Rudenko, 39 years old in 1943, had joined the Red Army in 1923 and graduated from flight school four years later. During the 1930s, he rose to squadron and then bomber brigade command levels. In January 1941, Rudenko was put in charge of the 31st Air Division of the Western Special Military District, a position he held when Germany invaded the Soviet Union. During the first years of the war, he served as the commander of various VVS formations under army and front command, before moving to serve as deputy commander of the Southwestern Front's VVS element. In October 1942, Rudenko took over the newly formed 16th Air Army, leading it through the Stalingrad campaign, a command he would hold throughout the war and until 1947.

The Voronezh Front's 2nd Air Army was led by General Stepan Krasovsky, 43 years old in 1943, who took over the command from General Konstantin Smirnov on March 26. Krasovsky had a history of working well with Vatutin, who had assumed the front command on the 18th of the same month. Krasovsky had served in the Tsarist military during World War I as the chief of an aviation radio station. He joined the Red Guards with the 1917 revolution and served as an aviation mechanic during the Russian Civil War, and ultimately was appointed as a commissar in the 11th Army during the 1921 Soviet invasion of Georgia. He continued to serve as a political officer until graduating from the Zhukovsky Military Air Academy in 1927. After a series of command positions in the 1930s, Krasovsky commanded the air forces of the 14th Army in the far north during the 1939 Winter War with Finland. Like Rudenko, Krasovsky commanded VVS elements supporting ground force armies and then fronts during the early months after the German invasion, and in May 1942 took command of the 2nd Air Army, leading it as Soviet forces were driven back towards Stalingrad and the Caucasus Mountains in the summer and fall. Krasovsky was given command of

the 17th Air Army in November, the month of the Soviet Operation *Uranus* counteroffensive, and led it until March 1943, when he returned to the 2nd, a command he would hold until the end of the war.

Although the ground forces of the Southwestern Front played a minimal role in the defensive phase of the battle of Kursk, its supporting 17th Air Army operated throughout the battle against VIII. Fliegerkorps' eastern flank. The 17th's commander, General Vladimir Sudets, was an experienced airman, entering the VVS as a mechanic in 1925 and training as a pilot in 1929. During the prewar years, Sudets served as an advisor in Mongolia, and fought in the Russo–Finnish Winter War. He led the 1st Bomber Corps on its formation and turned it over to Soviet Pe-2 bomber ace Ivan Polbin in March 1943. Sudets then assumed command of the 17th Air Army, which he would lead for the rest of the war. Sudets would ultimately fly 45 different types of Soviet combat aircraft during his career.



Aleksandr Novikov, shown here in 1944 after his promotion to the rank of marshal, was one of the great – and relatively unknown in the west – aviation leaders of World War II. Assuming command of the VVS in early 1942, he instituted organizational, training, and doctrinal reforms that greatly improved Soviet effectiveness in the air. In the summer of 1943, he coordinated the operations of the 2nd, 17th, and 16th Air Armies in the defense of the Kursk salient, and then those of the 1st, 15th, and 16th Air Armies and Long Range Bomber forces of ADD during Operation *Kutusov* against Army Group Center's Orel salient. (Keystone/Hulton Archive/Getty Images)

Order of battle

The battle for Kursk primarily involved the Voronezh Front's supporting air army, the 16th, and the Central Front's 2nd and Southwestern Front's 17th operating in the southern portion of the salient. The Steppe Front's 5th VA sent reinforcements to the front after several days of battle, and the Western Front's 1st VA and Bryansk Front's 15th VA joined in the Operation *Kutusov* offensive against the Orel salient on July 12. The 2nd, 16th, and 17th VAs, the primary forces opposing the initial *Zitadelle* attack, totaled 2,768 aircraft, facing the 1,830 of 1. Flieger-Division and VIII. Fliegerkorps.

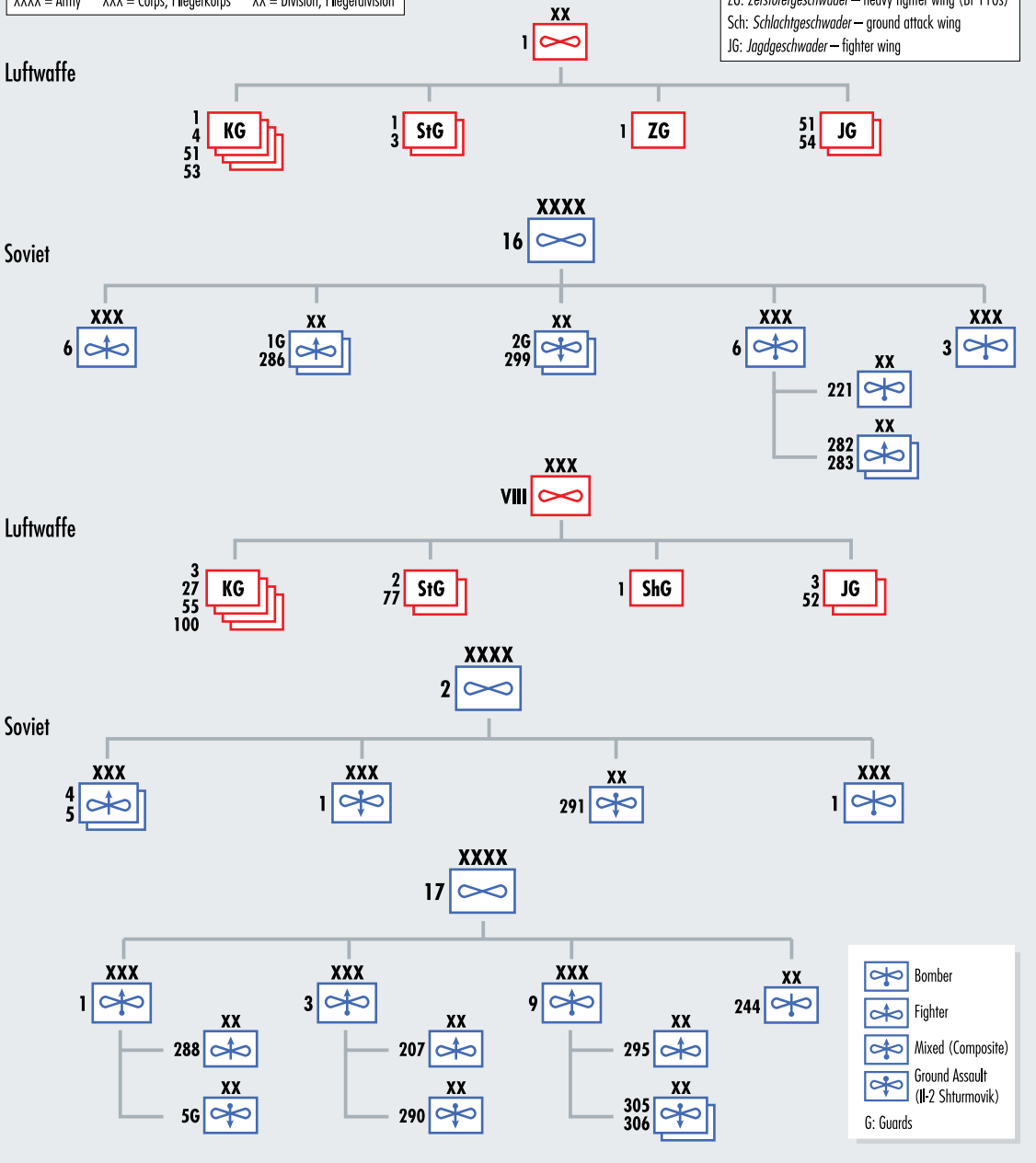
Soviet aircraft strength at Kursk, July 1, 1943				
	16th VA	2nd VA	17th VA	Totals
Fighters	526	474	206	1,206
Ground attack	269	299	266	834
Day bomber	274	190	78	542
Night bomber	76	49	61	186
Totals	1,145	1,012	611	2,768

The 2nd, 16th, and 17th VAs totaled over 1,200 fighters, heavily outnumbering their Luftwaffe fighter counterparts, although Luftflotte 4 and 6 had more day bombers, and the Pe-2 "Peshkas" had a smaller bomb load than the German He 111s and Ju 88s. The three VVS air armies were supported by about 500 medium bombers controlled by Long Range Aviation (ADD), which sent 26 of its 34 bomber regiments into the battle for Kursk for night operations. The USSR also had a separate air defense force, PVO, consisting of fighters, antiaircraft guns, and radars dedicated to defending urban areas, and the 280 fighters subordinate to the 101st PVO Division defended the local area around Kursk during *Zitadelle*.

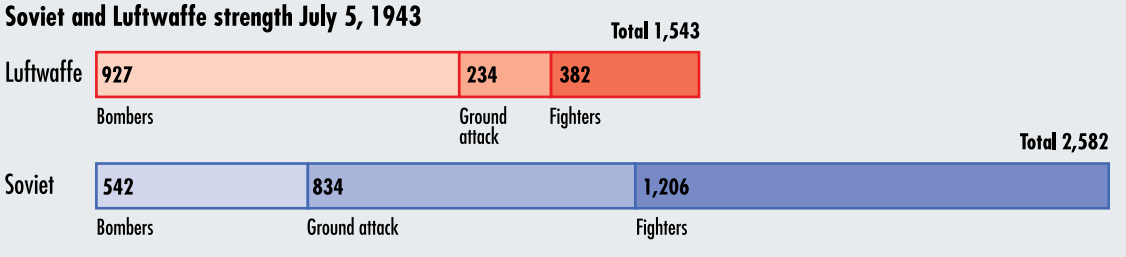
GROUND ATTACK AIRCRAFT COMPARISON: LUFTWAFFE AND VVS

XXXX = Army XXX = Corps, Fliegerkorps XX = Division, Fliegerdivision

KG: *Kampfgruppe* – bomber wing
StG: *Sturzkampfflugzeug* – dive bomber wing (Stukas)
ZG: *Zerstörergeschwader* – heavy fighter wing (Bf 110s)
Sch: *Schlachtgeschwader* – ground attack wing
JG: *Jagdgeschwader* – fighter wing



Soviet and Luftwaffe strength July 5, 1943



ORDER OF BATTLE

CENTRAL FRONT
16th Air Army (General-Leytenant Sergei Rudenko)
6th IAK
273 IAD: 157 IAP (Yak-1, Yak-7B, Yak-9), 163 (Yak-7B, Yak-9), 347 IAP (Yak-9)
279 IAD: 92 IAP (La-5), 486 IAP (La-5)

1st GIAD (Stalingradskiy): 50 GIAP (Airacobra), 53 GIAP (Yak-1), 54 GIAP (Yak-1), 55 GIAP (Yak-1), 67 GIAP (Airacobra)

3rd BAK
241 BAD: 24 BAP (Pe-2),128 BAP (Pe-2), 779 BAP (Pe-2)
301 BAD: 24 BAP (Pe-2), 54 BAP (Pe-2), 96 BAP (Pe-2)

6th SAK
221 BAD: 8 GBAP (Boston), 57 BAP (Boston), 745 BAP (Boston)
282 IAD: 127 IAP (Yak-1), 517 IAP (Yak-1), 774 IAP (Yak-1)
283 IAD: 56 GIAP (Yak-1), 176 IAP (Yak-1), 519 IAP (Yak-7), 563 IAP (Yak-1)

286th IAD: 165 IAP (La-5), 721 IAP (La-5), 739 IAP (La-5), 896 IAP (Yak-1)

299th ShAD: 41 ShAP (Il-2), 217 ShAP (Il-2), 218 ShAP (Il-2), 431 ShAP (Il-2), 574 ShAP (Il-2)

2nd GShAD: 58 GShAP (Il-2), 59 GShAP (Il-2), 78 GShAP (Il-2), 79 GShAP (Il-2)

231st NBAD: 44 GNBAP (U-2), 45 GNBAP (U-2), 970 NBAP (U-2), 372 NBAP, 71 NBAP

Regiments directly subordinate to 16 VA Headquarters:
16 ORAP (Pe-2)

16 VA aircraft strength on July 4, 1943			
	Serviceable	Non-serviceable	Total strength
Fighters	455	71	526
Shturmoviks	241	28	269
Day bombers	260	14	274
Night bombers	74	2	76
Totals	1,030	115	1,145

VORONEZH FRONT
2nd Air Army (General-Leytenant Stepan Krasovsky)
4th IAK
- 294 IAD: 183 IAP (Yak-1), 427 IAP (Yak-1)
- 302 IAD: 193 IAP (La-5), 240 IAP (La-5), 297 IAP (La-5)

5th IAK
- 205 IAD: 27 IAP (Yak-1), 438 IAP (Yak-1), 508 IAP (Yak-7B)
- 8th GIAD: 620 IAP (La-5), 40 GIAP (La-5), 41 GIAP (La-5), 88 GIAP (La-5)

1st BAK
- 1 GBAD: 80 GBAP (Pe-2), 81 GBAP (Pe-2), 82 GBAP (Pe-2)
- 293 BAD: 780 BAP (Pe-2), 804 BAP (Pe-2), 854 BAP (Pe-2), 23 GBAP (Pe-2)

1st ShAK
- 266 ShAD: 66 ShAP (Il-2), 673 ShAP (Il-2), 735 ShAP (Il-2)

A Soviet four-engine Pe-8 bomber. Fewer than 100 were built, and they were operated by Aleksandr Golovanov's Long Range Aviation (ADD) force. Pe-8s were used along with the much more numerous ADD Il-4 medium bombers for night raids on German rail lines of communication and rear areas during *Zitadelle*. Once radars for the small force of German night fighters operating in the Orel area became operational, they were able to down several ADD bombers, including Pe-8s, leading the Soviets to temporarily halt ADD night bombing operations. (San Diego Air & Space Museum/Public Domain)

A Soviet U-2 (later known as the Po-2) utility biplane being loaded with propaganda leaflets. The Soviet night bomber divisions, equipped with obsolete U-2, R-5, and R-Z biplanes, outnumbered their German counterparts and, with Long Range Aviation (ADD) bombers, dominated the night skies during the battle for Kursk. The U-2 could carry up to 350kg of bombs, much heavier than the light payloads of its Luftwaffe counterparts. Both sides dropped leaflets before and during the battle to weaken enemy morale and encourage surrender and desertion. (Sovfoto/ Universal Images Group via Getty Images)

- 292 ShAD: 667 ShAP (Il-2), 800 ShAP (Il-2), 20 ShAP (Il-2)
- 203 IAD: 247 IAP (Yak-1), 270 IAP (Yak-1), 516 IAP (Yak-1)

291st ShAD: 243 ShAP (Il-2), 245 ShAP (Il-2), 313 ShAP (Il-2), 617 ShAP (Il-2), 954 ShAP (Il-2)

208th NBAD: 646 NBAP, 715 NBAP, 887 NBAP

Regiments directly subordinate to 2VA Headquarters: 60 ORAE (Il-2)

2 VA aircraft strength on July 4, 1943			
	Serviceable	Non-serviceable	Total strength
Fighters	389	85	474
Shturmoviks	276	23	299
Day bombers	172	18	190
Night bombers	34	15	49
Totals	871	141	1012

SOUTHWEST FRONT

17th Air Army (General-Leytenant Vladimir Sudets)

1st SAK

- 288 IAD: 659 IAP (Yak-7B), 866 (Yak-7B)
- 5 GShAD: 93 GShAP (Il-2), 94 GShAP (Il-2), 95 GShAP (Il-2)

3rd SAK

- 207 IAD: 737 IAP (Yak-7B), 814 IAP (Yak-1), 867 IAP (Yak-1), 5 GIAP (La-5)
- 290 ShAD: 299 ShAP (Il-2), 625 ShAP (Il-2), 775 ShAP (Il-2)

9th SAK

- 305 ShAD: 175 ShAP (Il-2), 237 ShAP (Il-2), 955 ShAP (Il-2)
- 306 ShAD: 672 ShAP (Il-2), 951 ShAP (Il-2), 955 ShAP (Il-2)
- 295 IAD: 31 IAP (La-5), 116 IAP (La-5), 164 IAP (La-5)

244th BAD: 260 BAP (Boston), 449 BAP (Boston), 861 BAP (Boston)

262nd NBAD: 370 NBAP (U-2), 97 GNBAP (U-2)

Regiments directly subordinate to 17 VA Headquarters: 26 ORAP, 39 ORAP

17 VA aircraft strength on July 4, 1943			
	Serviceable	Non-serviceable	Total strength
Fighters	163	43	206
Shturmoviks	239	27	266
Day bombers	76	2	78
Night bombers	60	1	61
Totals	538	73	611

CAMPAIGN OBJECTIVES

Axis

With a larger offensive in the east beyond German resources in 1943, all possible combat power was concentrated around the Kursk salient for *Zitadelle*. The new offensive would have an attack frontage of around 200km with objectives 100km deep, in contrast to *Barbarossa*'s 2,000km front in 1941. Hitler's Operations Order No. 6, issued on April 15, called for the "best formations, best weapons, and best commanders" to be massed for the attack. Seizing Kursk would straighten German lines, regain an effective north–south rail link for the rapid shifting of forces behind the front, and encircle and destroy a major grouping of Red Army troops, potentially including major armor reserves. Hitler clung to the view that the huge Soviet losses over the last two years of combat had been so severe that the USSR was decisively weakened and hoped for a rapid victory with follow-on actions, including the establishment of a land link with Finland. If the Soviets proved more resilient, the Germans would hold the current front for as long as possible and, in late 1943, retreat to the completed Ostwall behind the Dnieper River, where it was hoped they could hold out indefinitely.

From the north, Army Group Center under Field Marshal Günther von Kluge's 9th Army, under General Walter Model, would attack with 14 infantry, six Panzer, and one Panzer-Grenadier division, totaling 335,000 troops controlled by five corps headquarters. Model's force included 920 tanks and armored fighting vehicles. Model planned to break through with his infantry and exploit with Panzer divisions. From the south, Field Marshal Erich von Manstein's Army Group South would attack with 20 divisions, of which six were Panzer divisions and four were elite Panzer-Grenadier divisions better equipped than standard Panzer units. Army Group South totaled 1,508 tanks and assault guns. Von Manstein planned to initiate his attack with a direct assault by his Panzer divisions, and the 4th Panzer Army under General Hermann Hoth would launch the primary attack with the II SS Panzerkorps of three elite Panzer-Grenadier divisions – SS Leibstandarte, Das Reich, and Totenkopf. An additional attack by Hoth's 48th Panzerkorps with the 3rd and 11th Panzer Divisions, as well as the lavishly equipped *Grossdeutschland* Panzer-Grenadier Division, would protect the II SS's left flank. As with the SS units, *Grossdeutschland* was a heavily equipped Panzer division in all

A meeting of Hitler and his high command in February 1943 during the German retreat into the Ukraine. Army Group South commander Field Marshal Erich von Manstein is at the far left, and Wolfram von Richthofen, commander of Luftflotte 4, is at the far right. Despite saying he would not promote additional officers to marshal rank after newly promoted Field Marshal Friedrich von Paulus surrendered at Stalingrad, Hitler elevated von Richthofen to field marshal rank on February 15. (ullstein bild via Getty Images)

OPPOSITE KURSK: STATUS OF FORCES, 5 JULY, 1943

Chief of the Luftwaffe General Staff Hans Jeschonnek photographed around 1940. At the May *Zitadelle* planning conference, Jeschonnek argued against any further postponement of the offensive as the Luftwaffe was as ready as it could be. Hitler, however, postponed *Zitadelle* to allow additional new-production tanks to join the attacking force. Jeschonnek was worn out by dealing with Goering, and desperate to secure a field command in 1943. (Hulton Archive/Getty Images)

but name. Hoth's forces totaled 1,089 tanks and assault guns and 223,907 troops. Von Manstein allocated a separate army-level formation, Army Detachment Kempf, under General Werner Kempf, to cover Hoth's right flank with an attack launched from German bridgeheads across the Donets River. Kempf's primary attack formation was the 3rd Panzerkorps with the 6th, 7th, and 19th Panzer Divisions with 419 tanks and assault guns.

Luftwaffe planning for *Zitadelle*

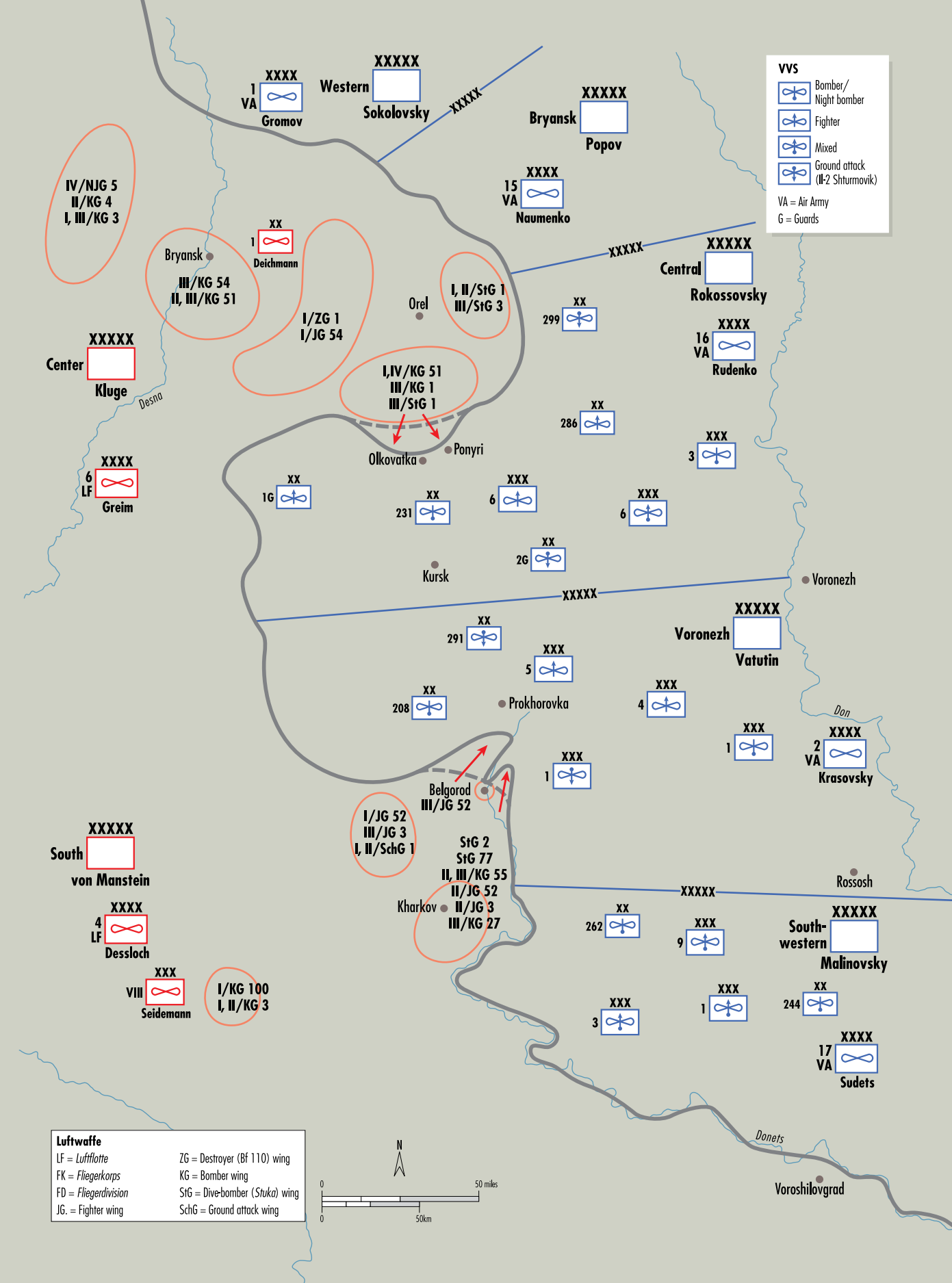
German planners considered Luftwaffe support to be a critical element of the offensive. Preparations for the aerial aspect of *Zitadelle* were orchestrated by the Chief of Luftwaffe General Staff (OKL) General Hans Jeschonnek, although OKL guidance was general, with specific operations left to the Luftflotte level. The OKL expected strong Soviet opposition in the air, given the qualitative and quantitative improvements in the VVS over the last months. With respect to Army Group Center, Jeschonnek noted the Luftwaffe ground support role would be particularly critical, given the 9th Army's smaller number of Panzer divisions and relative weakness in artillery, as well as the need to maintain readiness to deal with a potential Soviet counteroffensive against the Orel salient. The plan called for transport aviation to play a major role by delivering supplies to advancing Panzer spearheads once they achieved the hoped-for breakthrough. Luftflotte 4 identified providing air support to the attacking divisions and maintaining air superiority as VIII. Fliegerkorps' main objectives, with special attention to be given to the II SS Panzerkorps, the key breakthrough force. All units, including He 111s and Ju 88 bombers, were to focus on tactical targets on the battlefield, including artillery positions and pillboxes. Trains and vehicles would only be hit if carrying large enemy forces.

Zitadelle delays

Von Manstein had desired an immediate attack on the salient when the ground had adequately dried in the spring, but the offensive was repeatedly delayed. Although the Germans never identified the full strength of Soviet reserves, the Luftwaffe provided solid intelligence about the buildup in the salient, especially on the front lines. Walter Model, always doubtful of the wisdom of the attack, took the evidence of improved Red Army defenses to the early May high command planning conference at Munich, and von Manstein also thought the time for success at Kursk had passed. OKL Chief Jeschonnek argued against any further postponement, noting that the Luftwaffe would not benefit from further delay. Army Group Center commander von Kluge remained optimistic, however, and Hitler felt that an attack had to be launched given the overall deterioration of Germany's situation and the weakening resolve of his allies. Hitler was convinced that the new German Tiger, Panther, and Ferdinand tanks would have a decisive impact on operations at the front, and delayed A-Tag until June 12 to allow additional new-production tanks to join the force. The attack was soon postponed further, to June 21, July 2, before finally, on July 1, A-Tag was set for the 5th.

Soviet

Soviet intelligence had provided timely strategic warning of the *Zitadelle* plan. Stalin was inclined towards a preemptive attack, but Zhukov persuaded him to allow the Red Army to absorb the German blow and attrit the attackers before launching its own series of summer


VVS
Bomber/ Night bomber
Fighter
Mixed
Ground attack (Il-2 Shturmovik)
VA = Air Army
G = Guards
XXXX 1 VA Gromov
XXXXX Western Sokolovsky
XXXXX
XXXXX Bryansk Popov
XXXX 15 VA Naumenko
IV/NJG 5
II/KG 4
I, III/KG 3
XX 1 Deichmann
Bryansk
III/KG 54
II, III/KG 51
I/ZG 1
I/JG 54
Orel
I, II/StG 1
III/StG 3
XXXXX Central Rokossovsky
XX 299
XXXX 16 VA Rudenko
XXXXX Center Kluge
Desna
I,IV/KG 51
III/KG 1
III/StG 1
XX 286
Olkovatka
Ponyri
XXX 3
XXXX 6 LF Greim
XX 1G
XX 231
XXX 6
XXX 6
XX 2G
Kursk
Voronezh
XXXXX
XXXXX Voronezh Vatutin
XX 291
XXX 5
XX 208
Prokhorovka
XXX 4
XXX 1
XXXX 2 VA Krasovsky
Don
XXX 1
Belgorod
III/JG 52
I/JG 52
III/JG 3
I, II/SchG 1
StG 2
StG 77
II, III/KG 55
II/JG 52
II/JG 3
III/KG 27
Kharkov
XXXXX South von Manstein
Rossosh
XXXXX
XXXX 4 LF Dessloch
XX 262
XXX 9
XXXXX South-western Malinovsky
XXX VIII Seidemann
I/KG 100
I, II/KG 3
XXX 1
XX 244
XXX 3
XXXX 17 VA Sudets
Donets
Voroshilovgrad
Luftwaffe
LF = Luftflotte
FK = Fliegerkorps
FD = Fliegerdivision
JG. = Fighter wing
ZG = Destroyer (Bf 110) wing
KG = Bomber wing
StG = Dive-bomber (Stuka) wing
SchG = Ground attack wing
N
0
50 miles
0
50km

offensives. Soviet aerial reconnaissance and partisan units carefully tracked the German buildup for *Zitadelle*, and the USSR massively reinforced its forces in the salient, building elaborate, deep lines of defensive fortifications. 300,000 civilian workers joined in the Red Army's efforts, creating three major lines of defense backed by additional defensive positions all the way to Kursk itself. The works contained over 4,800km of trenches and over 400,000 mines. The defenses consisted of strongpoints with interlinking fields of fire, and each forward infantry company position could have as many as nine antitank and three artillery guns, a combat engineer platoon, and often one tank or self-propelled gun. Although the Red Army's limited communication networks and primitive staff training hindered rapid and flexible control of artillery support, the long preparation time at Kursk allowed for extensive pre-planning of supporting artillery fires. Holding the northern portion was the Central Front, under General Konstantin Rokossovsky, with five combined arms (infantry) and the 2nd Tank Army. To the south, General Nikolai Vatutin, assisted by political commissar Nikita Khrushchev, controlled four large, combined arms armies and General Mikhail Katukov's 1st Tank Army. These two fronts together contained 1,337,166 troops, almost 20,000 guns and mortars, and 3,433 tanks and self-propelled guns. Not content with this formidable force, Stavka created the Steppe Reserve Front under General Ivan Konev with 573,195 additional troops and 1,513 tanks.

Stalin and the Stavka concentrated a huge amount of combat power to repulse the offensive at Kursk, but maintained strong forces all along the front, and planned a series of summer and fall offensives once *Zitadelle* was halted. In Operation *Kutusov*, the Western and Bryansk Fronts would join with Vatutin's Central to eliminate the Orel salient. Subsequently, the Voronezh and Steppe Fronts would strike to retake Belgorod and Kharkov in Operation *Rumyantsev*. The Southwestern and Southern Fronts stood ready to attack over the Mius River when ordered, with the entire southern wing of the Red Army aiming to drive von Manstein's Army Group South back to the line of the Dnieper River and beyond.

Soviet aviation planning for Kursk

With excellent strategic warning of the impending German offensive, the Soviet air armies conducted intense and detailed planning for the defensive phase of the impending summer campaigning season, working with Front and Army ground force commanders to synchronize operations. Air Force Commander-in-Chief Novikov began supervising the planning in May, aided by First Deputy Commander Vorozheikin and VVS Chief of Staff Khudyakov along with their staffs. The VVS commanders visualized a three-phase operation. The VVS would disrupt the Luftwaffe with preemptive strikes during the expected two-to-three-day German buildup and forward deployment immediately before the initiation of the offensive. During the second phase, the VVS would engage the Luftwaffe when the offensive began over the forward lines of Soviet defenses, and then, in a third phase, concentrate operations on any German mechanized penetrations. The plans included numbers and timing of sorties, with three-to-four fighter and two-to-two-and-a-half daily flights per Il-2 and bomber, totaling 6,800–8,400 sorties over the first five days. Critically, the plans were drafted based on information on German disposition and plans passed by Soviet intelligence to the planners in May but were not updated as the situation changed in the month leading up to the start of the enemy offensive and proved of little use once *Zitadelle* began.

There was tension between Novikov's planners and Rudenko and Krasovsky about preemptive strikes on Luftwaffe airfields. Rudenko was concerned due to the losses suffered in the VVS attacks on German bases in the May attacks, and feared losses in a preemptive strike could compromise subsequent operations. Due to Rudenko's close ties with Central Front commander Rokossovsky, he was able to resist Novikov on the issue. To the south, Krasovsky agreed to launch the preemptive attacks, on the condition that Sudets' 17th Air Army to the south joined in.

THE CAMPAIGN

Preliminary operations

A formation of Ju 87 Stuka Ds. The first days of *Zitadelle* saw sustained Luftwaffe attacks on Soviet forward defenses, with repeated waves, sometimes of entire Stuka groups, delivering their bombs on small zones designated for Panzer division breakthroughs. (Keystone/Getty Images)

Although some accounts refer to a lull in air operations as both sides built up for *Zitadelle*, the VVS and Luftwaffe were highly active during the spring and early summer. With the end of the Soviet winter offensive in March, both air forces resumed operations against enemy rail lines of communication. The Luftwaffe had over 600 bombers on the Eastern Front, although the spring fighting over the Kuban peninsula drew off a portion of its strength, and soon it assembled dedicated *Eisenbahnstaffel* train hunting units using bombers from KG 1, 3, and 27. Specialized long-range aircraft from the Luftwaffe's elite strategic reconnaissance formation, *Fernaufklärungsgruppe* (Long Range Reconnaissance Group) 100, supported the counter-rail effort, and several of the bomber crews claimed large numbers of trains destroyed.

For their part, the Soviets had launched raids against German rail lines of communications in 1941 and 1942, but their efforts during the spring of 1943 benefited from greater numbers and experience. From April 1 to July 4, their Long Range Aviation (ADD) bombers launched a total of 9,400 nighttime sorties against rail targets. Partisan forces lit bonfires to help the bombers navigate and identify targets, and Hitler's *Zitadelle* delays allowed the Soviet line of communication efforts to have more effect. Colonel Hermann Teske, the officer in charge of Army Group Center's rail transportation network, reported 94 raids on the rail lines in April, 159 in May, and 123 in June, along with a reported 24 partisan attacks a day in June. He noted a total of 298 locomotives and 1,222 rail cars were lost to all causes, along with 48 bridges destroyed. The Germans rerouted trains to maintain traffic and operated trains during daylight hours to avoid losses to night attacks, but the attacks contributed to the Luftwaffe's difficulties providing adequate fuel supplies for *Zitadelle*.

Both sides flew extensive reconnaissance missions during the months leading up to *Zitadelle*. In April, Greim's Luftflotte 6 reconnaissance aircraft flew 1,638 sorties and photographed the entire Kursk salient, identifying the Soviet reinforcements transiting into the area and the intense work underway constructing defensive lines. Greim's efforts were maintained despite effective VVS raids in April which destroyed 25 percent of his specialized strategic reconnaissance aircraft at their airfields. Five long-range reconnaissance Ju 88s of 1.(F)/100

and 4.(F)/121 and three Do 17/217 of 2 *Nachtaufklärungstaffel* (night reconnaissance squadron) were destroyed on April 17, and another ten aircraft in a raid three days later.

By late May, Luftflotte 6 commander von Greim determined to launch a large-scale air attack against the Kursk rail station to disrupt the Soviet buildup in the salient, with the bombers flying during the day to ensure accuracy. On May 22, 64 Ju 87s, 29 Bf 110s, eight He 111s, and ten Fw 190 fighter bombers, escorted by fighters from JG 26 and JG 51, flew off to attack the station. The first wave of attackers started a major fire at the facility. The second wave was intercepted by fighters from the 16th Air Army and 101st PVO Fighter Division, losing nine II/StG 1 Stukas and three other aircraft. Lieutenant Viktor Bashkirov led seven 519th Fighter Regiment Yak-7Bs into action and claimed to have downed six of the nine Ju 87s lost during the raid. Despite the damage inflicted by the first wave, the Soviets were able to restore operations at Kursk within 12 hours.

Greim responded with Operation *Carmen*, drawing bombers from both Luftflotte 4 and 6 and planning a "star attack" on the rail station with aircraft approaching from multiple directions to confuse the defenders. The raids began on June 2 and continued into the night, resulting in a major aerial clash over Kursk. The first wave of 100 bombers with 30 escort fighters arrived at 0400hrs, and the second and third waves at 0540 and 0730hrs added another 100 bombers and 55 fighters. Eighty-six Soviet fighters rose to intercept the attackers and although 55 German bombers were able to reach the target, their bombs were scattered and caused little damage. Another 100 bombers arrived at 1100hrs but were met by 205 Soviet fighters. A total of 17 German aircraft were downed, and eight returned with severe battle damage. StG 77 took heavy losses during the operation, losing six Ju 87s. A subsequent night raid by 202 bombers had little impact. After Operation *Carmen*, the Luftwaffe used only night raids to strike targets deep in Soviet territory.

The Soviets in turn attempted to disrupt enemy preparations for the summer offensive. In early May, believing *Zitadelle* would begin in the middle of the month, the VVS conducted three days of raids against German airfields near the Kursk salient. Aircraft from the 1st, 2nd, 8th,15th, 16th, and 17th Air Armies participated. The operation was planned in great

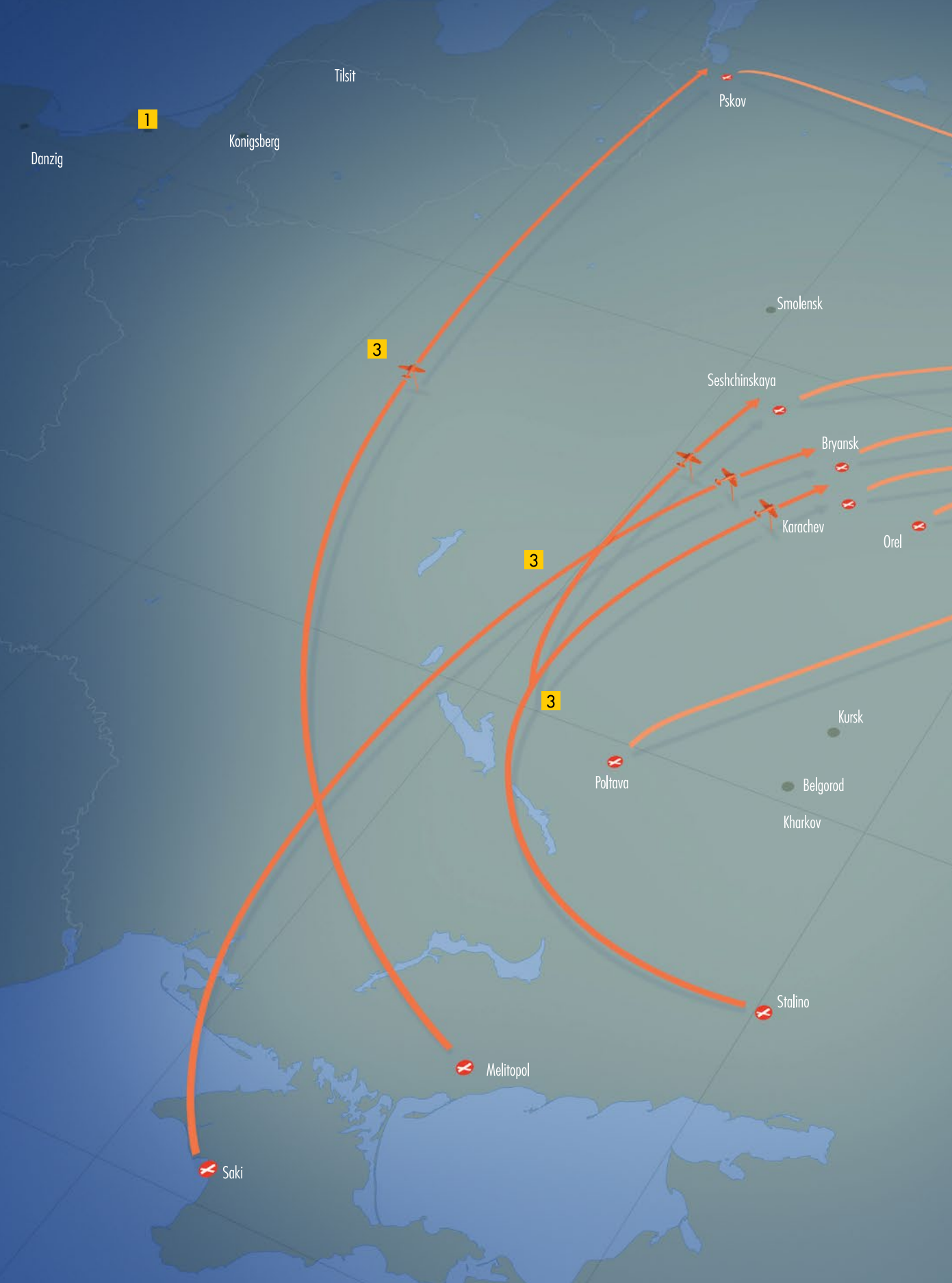
Marshal Georgy Zhukov consults with General Ivan Konev, the commander of the Steppe Reserve Front during *Zitadelle*. Zhukov convinced Stalin to allow the Germans to launch the first attack, and only counterattack after they had suffered heavy losses. In the Soviet military, VVS air army commanders were subordinate to the front commander, who often directly intervened in air operations. (mil.ru/CC-BY-4.0)

He 111 bombers delivering their bomb loads on an Eastern Front target in 1943. After suffering heavy losses in its Operation *Carmen*, the Luftwaffe discontinued daylight bombing raids on targets deep behind the Soviet front line, and von Greim's June strategic bombing raids on Gorky, Saratov, and Yaroslavl were all flown at night. (Keystone-France/Gamma-Keystone via Getty Images)

secrecy and 1,392 sorties were launched against 17 Luftwaffe bases. The first wave of 404 VVS aircraft flew under radio silence and arrived at its targets early on the morning of May 6. Twenty-two German aircraft were destroyed on the ground, including eight fighters from JG 51, six bombers from KG 4, and six reconnaissance aircraft from 4.(F)/11. The VVS continued the raids for the next two days but now encountered alert German defenses and suffered heavy losses. In the end, the operation cost 122 VVS aircraft. After Greim began to launch his series of strategic raids into the USSR in June, Stalin ordered additional attacks on Luftwaffe airfields, this time aimed at the German bomber bases. A series of raids ensued during June 8–10, and although the VVS claimed to destroy 580 to 750 enemy aircraft, only eight German aircraft were lost at the cost of 25 Soviet.

Although Greim's attacks on the Kursk rail network had been unsuccessful, he used the delay of *Zitadelle* to early July to advocate for a series of strategic bombing raids to weaken the Soviet war effort. The OKL reviewed and approved his plans and gave Greim temporary control of almost all the bomber wings on the Eastern Front, including KG 1, 3, 4, 27, 53, 55, and 100. Luftwaffe staffs had been examining potential strategic targets in the USSR since 1941, primarily focused on the Soviet aviation industry. They identified seven plants producing aircraft engines, five of which were within range of the German bomber force. Given the deteriorating situation at the front, however, the 1943 target planning was done in consultation with the army, which pushed for strikes that would hinder Soviet tank production. The Luftwaffe selected three targets: the GAZ auto plant in Gorky (modern Nizhny Novgorod) which produced a major portion of the Red Army's T-70 light tanks, a rubber plant in Yaroslavl, and an oil refinery at Saratov. The Yaroslavl and Saratov targets may have been reflections of the challenges faced by Germany's own war economy, which had to deal with critical bottlenecks with oil and rubber supplies. Luftwaffe intelligence believed that the Saratov facility was one of the few in the USSR able to refine crude oil into high octane fuel.

The raids began on the night of June 4–5, with 168 bombers, predominantly He 111s, dropping 179 tons of bombs on the GAZ facility at Gorky and returning to hit the target for the next three nights. The Luftwaffe would ultimately fly seven raids against Gorky in June with a total of 682 sorties dropping 1,015 tons of bombs. Soviet night fighters


Tilsit
Pskov
1
Konigsberg
Danzig
Smolensk
3
Seshchinskaya
Bryansk
Karachev
Orel
3
3
Kursk
Poltava
Belgorod
Kharkov
Stalino
Melitopol
Saki

Luftwaffe bombing campaign: April–June, 1943

EVENTS

1. During April 1943, Soviet Long Range Aviation flew a small number of "morale raids" with their Il-4 medium and a small number of Pe-8 four-engine bombers against Königsberg, Danzig, and Tilsit in East Prussia. The damage inflicted was small, but, like the US 1942 Doolitte raids on Japan, served to raise morale on the home front.

2. German intelligence attempted to leak information to the Soviets indicating that a new bombing campaign against Moscow would begin on June 5. Possibly as part of this deception program, on June 2, a Ju 88 D long range reconnaissance aircraft over Moscow was intercepted by two Soviet PVO air defense MiG-3 fighters, rammed by one of them, and crashed on the Napoleonic battlefield at Borodino.

3. General Robert Ritter von Greim, the commander of Luftflotte 6 and the main proponent of the strategic bomber effort, is given temporary command of most bomber assets in the East. To mislead the Soviets, the Luftwaffe waits until early June to shift units for the attack. II/KG 55 and I/KG 100 transfer from Stalino to Seshchinskaya and Karachev, III/KG 4 flies from Saki in the Crimea to Bryansk, and KG 27 from Melitopol to Pskov. Greim ultimately has a force of 439 bombers – 135 Ju88s and 304 He 111s – under his command.

4. Greim launches the first raid of the campaign against the GAZ No. 1 tank plant in Gorky (modern Nizhny Novgorod) on the night of 4–5 June using 168 Ju 88s and He 111s from KG 1, 3, 4, 27, 55, and 100. The bombers deliver 179 tons of bombs and begin a large fire at the works. Six German bombers fail to return to base.

5. Five more raids on Gorky follow, with a total of 703 bombers attacking the GAZ works. Despite the extensive damage, the GAZ works are fully operational in August.

6. The Luftwaffe also attacks the large rubber plant at Yaroslavl, flying 197 bombers against the target in two raids. A total of six additional He 111s are lost during the attacks.

7. The third Luftwaffe target, the oil refineries at Saratov, is attacked by 233 bombers in four raids.

had only primitive ground radar guidance, and typically relied on searchlights to find and engage German bombers. Although the PVO claimed 154 enemy aircraft shot down, only six German bombers were lost. On June 9 and the 20th, 102 and 88 bombers respectively raided Yaroslavl, dropping a total of 324 tons of bombs, claiming to inflict heavy damage on vital parts of synthetic rubber plant SK 1. Four additional raids on June 12–15 against oil refineries in Saratov added another 181 tons of bombs to the campaign.

Although it suffered few losses, von Greim's raids were on a modest scale and had an extremely limited impact on the Soviet war effort. In comparison, the combined bomber offensive dropped 17,601 tons of bombs on Germany during the same month. The most effective of the Luftwaffe strikes were the ones on the GAZ plant in Gorky, which sustained significant damage, although the plant resumed production within six weeks and was back in full operation on August 18. The Luftwaffe did not attack another plant in the city, GAZ No. 112, which was one of the factories producing the critical T-34 medium tank. Gorky's Artillery Factory No. 92 and the Gorky Aircraft Construction Plant, which produced La-5 and La-5FN fighters, were also not hit. Despite the demands of the front, after *Zitadelle* the Luftwaffe would continue its interest in resuming a strategic bombing campaign in the east, briefly assembling a strategic bombing force in 1944 and planning for raids as deep as the Moscow area even into the last year of the war.

Zitadelle: The first day, July 5

Soviet intelligence had been able to provide strategic warning of the looming *Zitadelle* offensive, but failed to identify the exact day and time when the attack would begin. Luftwaffe tactical camouflage and deception measures proved effective, with staffs and combat aircraft only deploying to their forward airfields late on July 4. The 400 enemy aircraft located in VIII. Fliegerkorps' sector grew to 700 between 1700 and 1830hrs as additional units earmarked for *Zitadelle* flew in just hours before the offensive began. German preparatory ground operations on both fronts gave the first clear warning to the Soviets that A-Tag was about to begin. In the south, the 48th Panzerkorps attacked with Stuka support to clear the

Disabled Panther tanks photographed from the air. Hitler hoped that the brand-new Panther medium tanks would prove a major advantage for the *Zitadelle* assault forces, and 90 were rushed to augment Army Group South's *Grossdeutschland* Division. During the assault, however, the new tanks experienced many mechanical teething issues, and most were out of action after the first day either due to breakdowns or mines. Soviet after-action analysis identified at least one Panther destroyed by a Soviet PTAB bomb.(Nik Cornish at www.Stavka.photos)

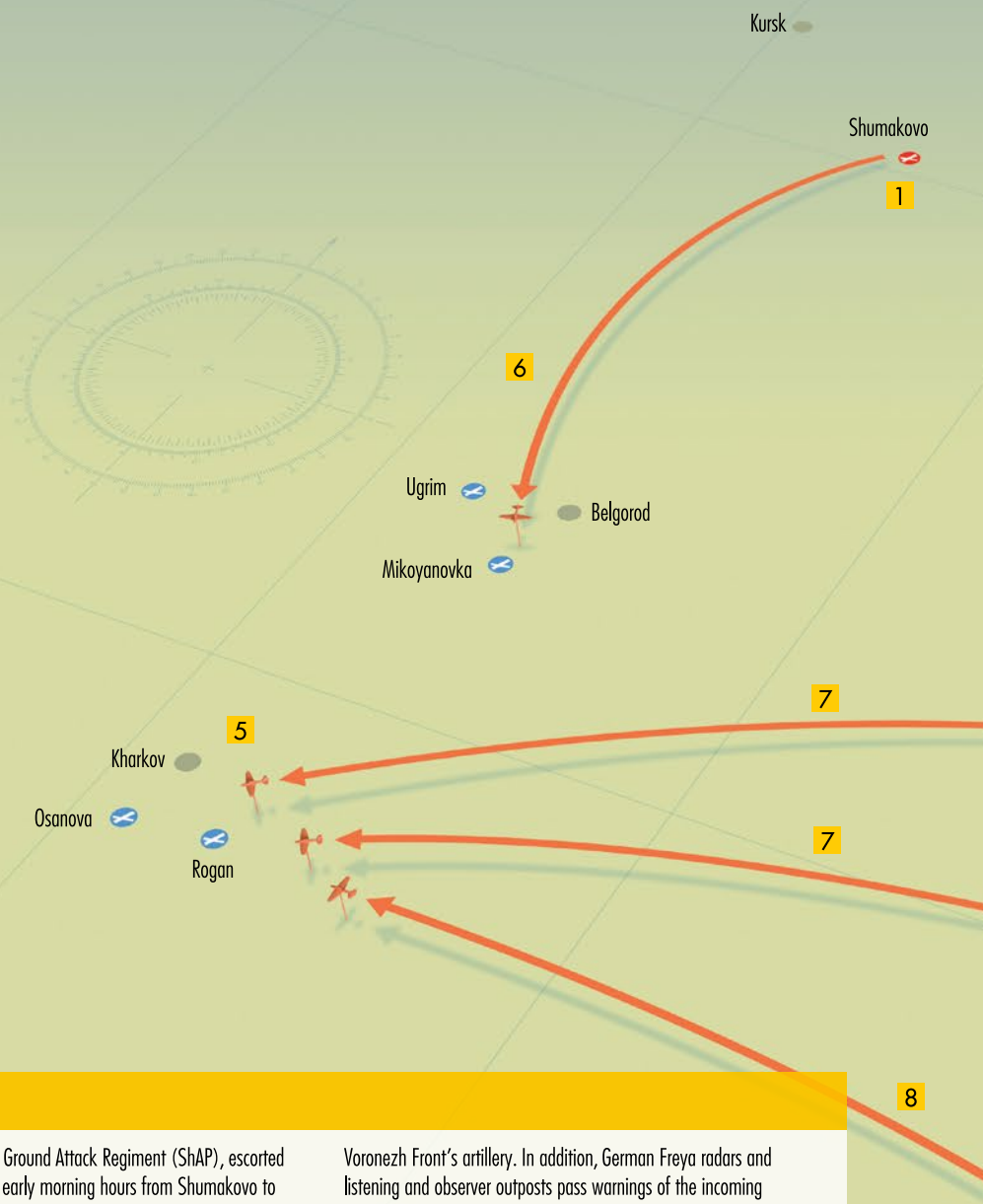
6th Guards Army's outpost line late on July 4. In the north, a prisoner taken from a German 6th Infantry Division mine-clearing party taken during the night confirmed the offensive would begin within hours. As a result, the Central Front began a preemptive artillery barrage at 0220hrs to try and disrupt the assault, soon joined by the Voronezh Front. Neither had forward observers able to observe and correct fires, reducing the barrages to area harassment artillery fire.

The Southern Front

To the south, the 2nd and 17th Air Armies launched their planned preemptive attacks on Luftwaffe airfields at 0400hrs, hoping to catch as many as 150 enemy aircraft on the ground at crowded bases around Belgorod and Kharkov. The attacks had been carefully planned and involved detachments of fighters assigned to "blockade" some airfields while Shturmoviks struck others, flying in from the east to hinder the defending Flak gunners. Each air army launched 66 Il-2 Shturmoviks with heavy fighter escort. Rather than using one or two divisions to conduct the entire raid, regiments were assembled in the air from a variety of corps and divisions in the two armies, and many of the pilots were flying their first combat mission. Krasovsky sent Il-2s from his 1st Ground Attack Corps and the independent 291st Ground Attack Division, with fighter cover provided by the 4th and 5th Fighter Corps. Sudets dispatched mixes of Il-2s and fighters from his 1st, 3rd, and 9th Composite (Mixed) Air Corps.

The attackers found the enemy airborne and on the alert. The German radar network tracked the incoming attack with its Freya radars. Furthermore, the Luftwaffe had just

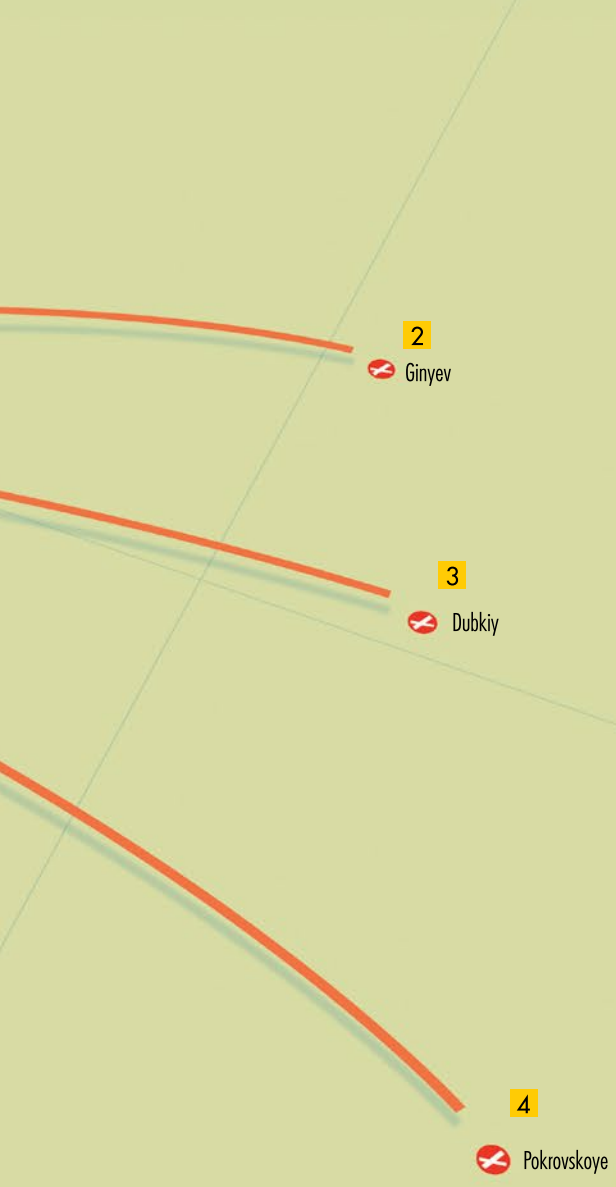
A Luftwaffe intelligence graphic of Gorky with various targets and locations annotated. Von Greim's brief strategic bombing offensive in June suffered few losses and severely damaged a plant that produced T-70 light tanks in the city. The raids did not hit other facilities in the city that produced T-34 medium tanks or La-5 fighter engines. (Public domain/Wikimedia)



EVENTS

1. Eighteen Il-2s of the 241st Ground Attack Regiment (ShAP), escorted by Yak-7Bs, take off in the early morning hours from Shumakovo to attack the airfield at Mikoyanovka.
2. Thirty Il-2s of the 820th ShAP take off from Ginyev to attack Rogan airfield near Kharkov.
3. Eighteen Il-2s from the 66th and 735th ShAPs take off from Dubkiy, also aiming at Rogan.
4. A final 18 Il-2s from the 17th Air Army's 237th ShAP take off from Pokrovskoye, although four Il-2s turn back because of mechanical issues. Only two of the 237th's pilots have previously performed combat missions.
5. Rather than be taken by surprise, the Luftwaffe is alert and active as the Soviet aircraft begin their flights. The early preemptive Soviet artillery barrage leads VIII. Fliegerkorps to launch its bomber force with its fighter escort earlier than planned to attack the Voronezh Front's artillery. In addition, German Freya radars and listening and observer outposts pass warnings of the incoming strikes.
6. As many as 160 Bf 109 German fighters engage the attackers, with many being vectored from one engagement to another. JG 3 and JG 52 fighters intercept the 241st, shooting down seven Il-2s and three Yak-7Bs, with German ace Erich Hartmann claiming an Il-2. The 11 surviving Il-2s, some with dead rear gunners and battle damage, press on to attack Mikoyanovka, but find it empty as the Luftwaffe had transferred its fighters from there to Ugrim the day before.
7. Many of the 820th, 66th, and 735th ShAP's Il-2s reach Rogan, but also find it empty, as the Luftwaffe has just sent its aircraft aloft to attack Soviet artillery because of alerts of the incoming attack. The three regiments lose four Il-2s and inflict minor damage to the airfield infrastructure.
8. The inexperienced 237th ShAP loses 13 of its 14 Il-2s shot down.

The VVS's strike on Luftwaffe VIII. Fliegerkorps airfields, July 5, 1943



An He 111 at Stalino (modern Donetsk) airfield in 1942 being loaded with bombs for targets in the Black Sea area. Many German aircraft assigned to *Zitadelle* were stationed at bases distant from the salient and only arrived in the battle zone in the hours before the attack in an effort to deceive the Soviet defenders as to the exact timing of the offensive. (Sobotta/ullstein bild via Getty Images)

completed the deployment of many of its aircraft from the targeted bases to forward airstrips closer to the front, leaving them empty, and due to the preemptive Soviet artillery barrages Seidemann ordered strike packages to take off immediately to hit enemy artillery positions. Rather than finding enemy aircraft vulnerable at crowded bases, the 2nd and 17th Air Army attackers were met by large numbers of German aircraft already aloft and flying towards Soviet lines.

Waves of Bf 109s from JG 3 and JG 52 made repeated high-speed diving attacks on the tight formations of Il-2s and their fighter escorts. Many of the inexperienced Soviet pilots tried to hold a steady course while others scattered. Chief of OKL Jeschonnek was at VIII. Fliegerkorps' headquarters on a familiarization visit during the morning and shared some anxious minutes with Seidemann as they tracked the approaching VVS attack, but they were soon relieved to see numbers of Soviet aircraft plunging earthwards. The Luftwaffe claimed 33 Il-2s and 14 Soviet fighters shot down in under an hour. Flak along the approach routes and defending the airfields also scored hits, and the few Soviet aircraft that reached their targets, some of the Il-2s carrying wounded or dead rear gunners, could only deliver haphazard attack runs. Total Soviet losses from the 417 aircraft sent into the attack are uncertain, but likely in the 35–40 range, with the Luftwaffe suffering negligible losses.

Apart from the failed preemptive attack, the 2nd and 17th Air Armies were slow to send their aircraft into action. With little opposition, Seidemann's Stukas, bombers, and ground support aircraft soon arrived over Soviet lines and began to systematically hit artillery batteries, assembly areas, vehicle columns, and antitank positions. The German air-ground coordination system worked smoothly, with the *flivos* at divisional and regimental headquarters sending up situation reports, calling in strikes, and adjusting targets at the front. The Luftwaffe concentrated against the 6th Guards Army's defenses in the path of Hoth's 4th Panzer Army, and Kempf's 3rd Panzerkorps on the eastern bank of the Donets River was expected to conduct its flank support mission against the 7th Guards Army to its front with minimal air support.

While the Luftwaffe's command and control network was working smoothly, Krasovsky's was not. As it had not sent the liaison officers to the ground force armies it was supposed to support as planned, the Soviets were forced to run the air battle from Krasovsky's headquarters, isolated from the dynamic situation at the front. As a result, the VVS was slow to get into action. The 5th Fighter Corps was tasked to cover the troops manning the forward defenses, but only 12 La-5s of the 41st Guards and eight Yak-7Bs of the 508th

Fighter Regiment were overhead when the first VIII. Fliegerkorps aircraft arrived. The 508th's Yaks managed to shoot down one I/KG 100 He 111 and another bomber had to belly land due to damage. The Luftwaffe met few other VVS aircraft, however, and Soviet ground observers soon reported 400 German aircraft operating over a 32km-wide sector of the front with little VVS opposition. The 52nd and 67th Guards Rifle Divisions facing the II SS and 48th Panzerkorps were under continuous air attack during the day. Five Stuka *Gruppen* bombed the 67th in one massive strike. Still, the attacking German divisions encountered mines and artillery and antitank fire from the surviving defenders. Even when able to move forward, the Stukas' bombs had created a muddy, cratered battlefield that was difficult to traverse.

While the Ju 87s and bombers pummeled the Soviet front-line defenses, the Bf 109s flew patrols several miles deep into enemy-held territory to intercept any VVS response. By seven in the morning, Krasovsky realized that his 5th Fighter Corps was failing in its mission and sent the bulk of his fighter force to clear the way for his bombers and Il-2s, followed by Pe-2s of the 1st Bomber Corps and Shturmovik regiments. Some Il-2 pilots were able to get through to make attack runs on elements of the II SS and 48th Panzerkorps, but the Bf 109s shot down 18 Shturmoviks between 0730 and 1030hrs. The presence of escorting VVS fighters was of little help; some were lured away to chase the Bf 109s and left the Il-2s vulnerable, while others flew rigidly alongside the Shturmoviks, giving the Bf 109s more targets as they launched repeated high-speed diving attacks. During the late afternoon the focus of air action shifted from the 4th Panzer Army's front to the Donets area where with little air support, Army Detachment Kempf's Panzers had been held up by the 7th Guards Army's firm defenses. During the late afternoon, Sudets began to send his Il-2 regiments in to attack the German pontoon bridges over the Donets, but Seidemann was able to rapidly vector Bf 109s to intercept, and the 17th Air Army lost 55 Shturmoviks out of 200 to the cost of six Bf 109s.

The Luftwaffe had won a clear air-to-air victory over the southern portion of the Kursk front on July 5. Seidemann's fighters had flown fewer sorties than its opponents – 317 to 835 – but the 2nd and 17th Air Armies had lost 186 aircraft to the outnumbered Bf 109s and German Flak. Six Luftwaffe pilots registered claims for six or more air-to-air kills, with Captain Johannes Wiese leading with 12 Il-2s shot down, although he in turn had to make five forced landings due to battle damage during the day. As throughout the battle, Soviet pilots made wildly exaggerated claims, reporting 154 enemy aircraft shot down, although VIII. Fliegerkorps actually lost 27 aircraft, with an additional 18 suffering moderate to severe damage.

The Northern Front

Rudenko had been able to resist pressure from Novikov to begin the battle with preemptive airstrikes, but he remained uncertain that *Zitadelle* had truly begun, and his response to the initial waves of attacking Luftwaffe aircraft was hesitant. The bulk of the 16th Air Army remained on alert at their airfields during the first hours of the morning even though Deichmann's airmen had been ordered aloft at 0425hrs in response to the Central Front's preemptive artillery barrage. The first wave consisted of 150 bombers covered by fighters, and 20 Ju 88s of II/KG 51 and 60 He 111s from KG 4 and KG 53 launched the first Luftwaffe attack of the day. Strikes by three groups of StG 1 Stukas followed, with the Ju 87s diving to deliver high-explosive bombs against Soviet artillery positions in woods just behind the front line. Every ten to 15 minutes, new Luftwaffe aircraft arrived to launch attacks. The Bf 109s of the Flieger-Division's short-range reconnaissance group were kept aloft to spot additional Soviet artillery positions, and the VVS air monitoring network reported a total of 1,000 enemy sorties by 1100hrs, 800 of them bombers or attack aircraft.

An iconic picture of Luftwaffe air support for attacking Panzers from 1943, with Stukas overflying a Panzer column moving cross-country during Operation *Zitadelle*. The Germans had a well-organized air–ground liaison command and control system that allowed for rapid and effective close air support to its attacking forces at Kursk, and many mechanized units had *flivo* air liaison officers traveling with the forward elements. (ullstein bild via Getty Images)

Like Seidemann's Bf 109 fighters in the south, Deichmann's JG 51 and JG 54 Fw 190s established patrols 10–15km into Soviet-held territory to intercept any VVS aircraft approaching the front. With his forward rifle divisions under heavy air attack, Rokossovsky finally ordered Rudenko into action, and the 273rd and 279th Fighter Divisions of the 6th Fighter Corps and units from the 1st Guards Fighter Division were sent in to regain air superiority. A Yak-1 of the 54th "Stalingradskiy" Guards Fighter Regiment registered an early VVS success, shooting down Heinz Heil's Ju 87 D-3 of StG 1. The 16th Air Army's liaison and air-to-ground control system was better manned and equipped than Krasovsky's, but it was still overwhelmed by the intensity of German activity in the air, and Rudenko's halting commitment of fighters was poorly coordinated. By noon, only 520 Soviet sorties had flown to the front, and 1. Flieger-Division's Fw 190s had shot down 50 Soviet aircraft. The day saw the beginning of a remarkable run of kills for Hubert Strassel of III/JG 51. Strassel was 24 at the time and already had 42 air-to-air victories when *Zitadelle* began. On July 5, Strassel claimed 15 kills in his Fw 190, and would shoot down another four the next day, and six on July 7.

The Luftwaffe maintained continuous pressure on the Soviet 13th Army – the primary force blocking the 9th Army's advance – with its bombers often "stacked up" near the front, awaiting their turn to strike. The Stukas of StG 1 and StG 3 flew a record 647 sorties during the day, losing four Ju 87s. Despite the excellent close air support, Model's divisions made painfully slow progress in the face of minefields and intense artillery and antitank fire. The Germans soon committed their heavy Ferdinand self-propelled tank destroyers to get the assault moving, only to see many disabled in the minefields. On the western flank of the 9th Army assault, Luftflotte 6 commander Greim and Army Group Center commander Günther von Kluge witnessed repeated assaults by the 31st Infantry Division on Hill 224.9 stall. Greim arranged for two complete Stuka groups to strike the hill, but another three hours of heavy fighting was needed before the 31st seized its objective.

OPPOSITE
A German 20mm Flak gun. Soviet and German antiaircraft fire was a major threat, as most air operations on the Eastern Front took place at lower altitudes. Although a much higher percentage of aircraft were shot down in air-to-air combat, antiaircraft fire disrupted attack runs and inflicted damage in addition to bringing down a number of aircraft. (Nik Cornish at www.Stavka.photos)

By midday, concerned with German penetrations of the 13th Army's first line of defense, Rokossovsky ordered Rudenko to send in a massed bomber attack on the enemy spearheads. Due to the already high losses to his fighter regiments, Rudenko felt he could only protect a smaller force, and sent 225 Il-2s from the 299th and 2nd Guards Ground Attack Divisions and 105 bombers from the 221st and 241st Bomber Divisions into the fight. The 299th's inexperienced pilots took heavy losses, but the 2nd Guards, with some veterans of Stalingrad, claimed successful attacks against German tanks with the first use of the new PTAB shaped-charge bombs.

As the first day of *Zitadelle* drew to a close, 1. Flieger-Division flew the last of its 2,088 sorties. Rudenko's 16th Air Army had flown just over half this number, managing roughly one sortie per fighter, less than one per Shturmovik, and only one for every two bombers, while Deichmann's airmen flew three to four per available aircraft. Deichmann's 1. Flieger-Division fighter pilots flew 522 sorties on the 5th, and the Bf 109s flying 60 reconnaissance

A Yak-9 ready at its airfield. During the early morning hours of July 5, Operation *Zitadelle*'s "A-Tag," General Sergei Rudenko kept most of his aircraft on alert on their airfields, uncertain that the offensive had actually begun, allowing General Paul Deichmann's 1. Flieger-Division several hours to bomb Soviet defensive lines with little opposition. (Sovfoto/ Universal Images Group via Getty Images)

Bouncing the Shturmoviks July 5, 1943

Il-2 Shturmoviks from Krasovsky's 2nd Air Army are bounced by VIII. Fliegerkorps Bf 109s launching diving attacks from behind. The largely inexperienced Soviet airmen – many flying their first combat sorties – suffered heavy losses both in the northern and southern portions of the Kursk salient during the early days of the battle. The Il-2s typically held their formations, with escorting fighters at the same altitude, and suffered repeated losses to "boom and zoom" attacks launched by veteran Luftwaffe pilots.

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OPPOSITE
A Ju 87 Stuka squadron takes off for a dawn attack. The seven Stuka groups launched their last massed strike operations of the war during Operation *Zitadelle*, taking significant losses during the battle, including the loss of eight veteran Knight's Cross holders.(Nik Cornish at www.Stavka.photos)

sorties also engaged in some air-to-air combat. The 16th Air Army flew 817 VVS fighter sorties, but as in the south the air-to-air loss ratio again heavily favored the Luftwaffe. The 16th Air Army lost 100 aircraft, including 83 fighters, 16 Il-2s, and one Boston bomber. The 6th Fighter Corps alone lost 51 fighters, the 299th Ground Attack Division 14 Il-2s, and the 2nd Guards Ground Attack Division two. The fighters had, however, kept losses to the bomber force low, with the 221st Bomber Division only losing one Boston, while five had to make emergency landings, and the 241st Bomber Division had two of its Pe-2s forced to make emergency landings. 1. Flieger-Division lost 18 aircraft destroyed with another 11 damaged.

Summary

In total, July 5 had seen one of the largest and most intense days of air combat of World War II. The Luftwaffe had flown a total of 4,475 daylight sorties, while the VVS's 2nd, 16th, and 17th VAs flew 2,915. Forty-five German aircraft were lost, compared to the VVS's 286. The loss ratio reflected shortfalls in the VVS at all levels of command. Despite good strategic intelligence about *Zitadelle*, the Soviet response on A-Tag was halting. Army Group Center's report for the day described VVS air operations as "haphazard and disunited." The Soviet command and control system at the front was inadequate and overwhelmed, and the detailed pre-battle plans for operations were useless given the dynamic and fluid situation. Tactically, the inexperienced VVS Shturmoviks and fighters flew in single altitude formations vulnerable to diving attacks by the veteran German Bf 109 and Fw 190 pilots, resulting in a situation eerily like the massacre of Soviet SB bombers and Polikarpov I-15 and I-16 fighters in the early days of Operation *Barbarossa*.

The Luftwaffe had abandoned its standard approach of hitting enemy airfields at the onset of an offense in favor of providing their troops with some of the most effective close air support yet seen on the Eastern Front. The summer day was long and the weather clear, allowing for multiple German sorties – up to eight by some pilots – during the day. The German command and control system proved superior, with *flivos* providing situation updates and calling in airstrikes. In the north, under the effective cover from its JG 51 and JG 54 Fw 190s, 1. Flieger-Division flew 582 bomber, 647 Stuka, and 168 Bf 110 Zerstörer sorties, delivering 1,500 tons of bombs – 12 times more than the 16th Air Army. To the

Rearming a Ju 88. Although it lacked adequate fuel supplies at its forward bases, the Luftwaffe had sufficient bombs and ammunitions for the planned offensive. During Operation *Zitadelle*, the Ju 88 and He 111 bomber force was completely dedicated to close air support tasks, striking enemy targets at or close to the front line. (Nik Cornish at www.Stavka.photos)

south, Seidemann's VIII. Fliegerkorps aircrews flew 1,942 CAS sorties, fully 80 percent of its total effort: 1,017 by Stukas, 586 by He 111 and Ju 88 bombers, and 335 by its ground attack Fw 190s and Hs 123s. With the Bf 109s keeping Soviet aircraft from interfering, VIII. Fliegerkorps was able to keep constant pressure on Red Army ground forces. Directly in the path of the II SS Panzerkorps, the 52nd Rifle Division's 6 by 4km defensive zone was under continuous attack for 15 hours, with at times 20 German bombers simultaneously overhead. Roughly 30 percent of the division's 8,000 men were killed or wounded, and the sector saw the deepest German advances of the day.

The Luftwaffe's success in the air was not, however, matched by German progress on the ground. The II SS Panzerkorps was able to advance into the second Soviet defensive zone while minefields, artillery fire, antitank defenses, and difficult terrain limited the 48th Panzerkorps' advance. The 3rd Panzerkorps had the least success on the 5th, operating initially with almost no air support, although Seidemann was able to vector Bf 109s to protect the German bridges over the Donets against the 17th Air Army's evening Il-2 attacks. To the north, Model's initial attack with eight infantry and one Panzer division, soon reinforced

A profile view of a Pe-2 light bomber at its airfield. Like the Ju 88, the Pe-2 could perform capably as a level or dive bomber but had a shorter range and only about half the bomb load. Due to a lack of fighters after the heavy losses in the first days of the battle, Pe-2 units were often withheld from front-line operations. (Courtesy of the Central Museum of the Armed Forces, Moscow via Stavka)

OPPOSITE
Luftwaffe ground crew preparing an Fw 190 for a sortie. The high sortie rates – often from six to eight a day – maintained by German aircraft during *Zitadelle* placed a heavy burden on the ground crews. As the battle progressed, both sides' numbers of available aircraft were reduced due to maintenance issues in addition to battle damage and losses.(Nik Cornish at www.Stavka.photos)

A Stuka crewman prepares for flight. During the high-intensity battle for Kursk, German aircrew typically flew several sorties a day, with Ju 87 pilots and gunners sometimes reaching seven to eight. The Luftwaffe had prepared forward deployment airfields close to the front to allow for higher-intensity operations during *Zitadelle*.(Nik Cornish at www.Stavka.photos)

by a second, reported even less progress, and objectives that would have been captured in hours in 1941–42 remained out of reach at the end of the day. Along the 15km attack front the 9th Army had only advanced through the Soviet first line of defense and approached the 2nd in limited areas. The 20th Panzer Division made the deepest penetration, advancing about 8km, while the other divisions typically advanced no more than 6km. Although few of Model's tanks were permanently destroyed, about two-thirds of the 300 were out of action due to breakdowns, mines, or battle damage.

It was clear by the end of the day that German forces were facing a grinding, attritional battle rather than a rapid 1941- or 1942-style breakthrough. Despite the effectiveness of their defenses, however, Rokossovsky and Vatutin were alarmed, as pre-battle plans had presumed that the first Soviet defense line could be held much longer. Although their concept of operations called for the extensive attrition of the attacking force before their own counterattacks, both front commanders ordered their armored reserves to launch hasty counterattacks early the next day. Stalin himself was concerned not only with the progress of the enemy ground attack, but the situation in the air. As Rokossovsky reported the events of the day by phone to Stalin during the evening hours of July 5, the Soviet leader interrupted, demanding to know if the 16th Air Army had "at least seized control of the air" and if "Rudenko is up to the task" – a conversation overheard by Rudenko, who was standing nearby. Rokossovsky gave evasive answers, mentioning the wildly exaggerated kill claims reported by Soviet pilots, and promised that air superiority would be gained the next day.

July 6: the VVS strikes back

After their heavy losses on the first day of *Zitadelle*, Rudenko, Krasovsky, and Sudets were determined to regain the initiative. The day of July 6 dawned overcast and cloudy, and the afternoon brought occasional thunderstorms. Despite weather, losses, and maintenance challenges, the Luftwaffe and VVS airmen would each fly well over 2,000 daytime sorties, as the German ground forces redoubled their efforts to break through Soviet defensive lines and Rokossovsky and Vatutin attempted to launch their hastily ordered armored counterattacks.

The north

Although Model was disappointed with the results of the first day of the offensive, A-Tag's advance would be the 9th Army's most successful of *Zitadelle*. Model renewed his offensive around noon, now with eight infantry and four Panzer divisions in the line. The 47th Panzerkorps attacked towards Olkovatka to the west and the 41st Panzerkorps towards Ponyri to the east, fortified villages that would absorb the 9th Army's attention for the rest of the battle. On the Soviet side, Rokossovsky's planned July 6 counterattack with his 2nd Tank Army and two additional front-subordinate tank corps proved abortive. The orders only arrived at the attacking units late in the evening of July 5, leaving too little time for the units to move into position, and only the 16th Tank Corps was able to attack early in the day as scheduled.

Rudenko had felt the sting of Stalin's disapproval during the evening before and planned to launch a series of large-scale massed strikes during the morning to accompany the planned armored counterattack. An artillery barrage at 0330hrs started

the day, while Rudenko's first wave, consisting of 25 221st Bomber Division Bostons and escorting 282nd Fighter Aviation Division Yak-1s, taxied for take-off. Fighters from the 1st Guards Fighter Division were already sweeping the target area ahead, finding few enemy aircraft aloft as Deichmann allowed his pilots a brief rest during the early hours of the morning. Only two Bf 109s on a reconnaissance mission attempted to intercept the strike, and were fortunate to escape with heavy battle damage. The Bostons successfully bombed support areas behind Model's 2nd Panzer Division, disrupting morning resupply operations, and returned without loss.

Rudenko's second wave included Shturmoviks of the 2nd Guards Assault Division escorted by regiments from the 283rd Fighter Division, but by this point the German fighters had scrambled and, guided by smoke from the first wave's strikes, Fw 190s of JG 51 were able to intercept. The Fw 190s launched their diving attacks, and the Soviet fighters again forfeited any ability to match the attackers' speed and positional advantages by staying in formation. The 2nd Guards soon lost 15 Il-2s. By 0500hrs, Rudenko's third wave was met by an even larger force of JG 51 fighters, resulting in a large air engagement from 4,000m altitude down to treetop level. The Fw 190s were able to down some of the Bostons of the 221st BAD, but the 282nd Fighter Division's Yaks were able to tie many up in dogfights, allowing most of the bombers to deliver their bomb loads. The Soviets lacked liaison officers in the front line, unlike the Luftwaffe, and planning for air operations had difficulty keeping up with the situation on the ground. As a result, the 221st released their bombs on positions recently recaptured by Soviet ground units.

Rudenko's plans for additional strikes were disrupted when Rokossovsky, concerned with his floundering counteroffensive, urgently demanded to know when Rudenko's next wave would arrive over the front. When told that it would be in two hours, Rokossovsky ordered that any available reserve aircraft be immediately sent into action. Il-2s of the 229th Ground Attack Division were rapidly sent aloft and reached the front around 0700hrs. Arriving when many of the Fw 190s had returned to base to refuel and rearm, the 229th's Il-2s were able to use their circle and strike tactics to strafe and bomb enemy tanks, and Rudenko's postwar

Striking Soviet armor

Accounts of air operations at Kursk often exaggerated the effectiveness of attack aircraft on enemy armor, notably claiming that the Luftwaffe alone halted an attack by the 2nd Guards Tank Corps against the II SS Panzerkorps' right flank on July 6. Hs 129 B-2s of Major Alfred Druschel's 4.(Pz)/SchG 1 and PG 51 *Panzerjägerstaffel* joined in the engagement, strafing Soviet tanks with their 30mm cannon, while Fw 190 F-3 fighter bombers from SchG 1 bombed and strafed the supporting infantry. While German accounts claimed the Soviet attack had been turned back by the airpower alone, the 2nd Guards reported intense artillery and mortar bombardment, and enemy tank fire in addition to air attack. Probably 11 of the 24 Soviet tanks destroyed that day were lost to tank fire from the SS divisions, and at the end of the day, front commander Vatutin ordered the Soviet unit to withdraw due to its exposed position. Although the Soviet attack was halted by both ground and air opposition, the *Panzerjäger* played a significant role, and the Soviet tankers noted being attacked by groups of up to 40 Luftwaffe aircraft throughout the day.

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account claimed Soviet infantrymen jumped from their trenches to cheer the air attack. 2nd Tank Army commander General Alexey Rodin reported that the Shturmoviks destroyed 14 German tanks and damaged another 40, and only one Il-2 was lost.

1. Flieger-Division was not only engaged in intercepting Rudenko's massed attacks but launched its own Stukas, bombers, and Bf 110 Zerstörer to aid the 47th Panzerkorps' attack on Olkovatka, Model's primary effort for the day. 13th Army reserve elements reported being bombed by groups of 60 to 100 Luftwaffe aircraft. At 1500hrs, Bf 110 Zerstörer of ZG 1 intercepted the 150 tanks of the 19th Tank Corps, which had finally been able to launch a counterattack hours after their scheduled H-Hour. Deichmann followed up the Bf 110s by ordering formations of He 111s to attack with clusters of armor-piercing bombs over the Soviet tanks. The 19th Tank Corps reported that its infantry support elements were separated from tanks, and the attack came to a halt around 1850hrs.

The south

On the southern flank of the salient, Hoth aimed to drive the II SS Panzerkorps through the Soviet second defensive belt on July 6 but was concerned with Hauser's exposed flanks. The 48th Panzerkorps had been held up by the Soviet defenses, and Army Detachment Kempf's 3rd Panzerkorps on the eastern side of the Donets River was far behind schedule on Hauser's right. Alarmed by the 4th Panzer Army's progress the day before, Vatutin had ordered a major counterattack using his 1st Tank Army and two separate tank corps. Cloudy conditions during the early morning led Seidemann to give his pilots a brief respite, and fighter sweeps by Krasovsky's 4th and 5th Fighter Corps encountered almost no opposition. By 0900hrs, however, the Luftwaffe departed its bases to support the renewed Army Group South attack, with almost 200 sorties by close support aircraft soon battering the remnants of the 52nd and 67th Guards Rifle Divisions still in Hoth's path.

Sudets' 17th Air Army had lost heavily on the first day of *Zitadelle*, and its operations on the 6th were again delayed and ineffective. The 306th Ground Attack Division's 955th Ground Attack Regiment, formed in March, began its attacks in three separate groups of six Il-2s each with fighter escort. Seidemann had detached some fighters to cover the Donets crossings, and the Bf 109s of JG 3 and JG 52 peeled away the Soviet fighter escort and inflicted heavy losses, shooting down three of the first group of Il-2s, forcing another two to crash land, and downing three of the second group. Only the regiment's third assault group reached the target area, there losing one of its six Il-2s to an Fw 190 F-3 fighter bomber of 1/SchG 1. In all, the 17th Air Army lost a total of 21 Il-2s, a Boston bomber, four La-5s, and an R-5 biplane during the day. The 306th Ground Attack Division was left with 34 Il-2s available, about one third of its original strength.

The commander of the Soviet 1st Tank Army, Mikhail Katukov, was able to resist Vatutin's order that his forces launch an immediate frontal assault on the 48th Panzerkorps and – with the personal backing of Stalin – instead assumed defensive positions. The VVS covered the 1st Tank Army's deployment with patrols from its 4th and 5th Fighter Corps, meeting little opposition as the cold front's low clouds kept German aircraft grounded in the early morning. As the day progressed, Seidemann sent most of his aircraft to support the II SS and the attack east of the Donets, and the VVS was able to maintain a degree of air superiority over the 48th Panzerkorps' front, with the Il-2s of the 291st Ground Attack Division reporting success hunting and attacking German vehicles.

Although Katukov had been able to move his 1st Tank Army into defensive positions, Vatutin ordered his reserve 2nd and 5th Guards Tank Corps to attack the II SS Panzerkorps' exposed right flank. In response to calls for Luftwaffe support, Major Alfred Druschel's SchG 1 sent Hs 129s of 4.(Pz)/SchG 1 and JG 51's *Panzerjägerstaffel* (Panzer hunting squadron) to attack elements of the 2nd Guards Tank Corps. The Fw 190 Fighter Bombers of I/SchG 1 joined in, using their 500kg bomb containers to shower the enemy with small

SD 2 anti-personnel "butterfly" fragmentation bombs. The Soviet attack soon ground to a halt, and the Luftwaffe's role led this action to be one of several where it was later claimed that a tank attack was stopped "from the air alone." The airstrikes clearly played a role, and the LSSAH Division sent the Luftwaffe formal thanks for outstanding air support, but the Soviet tanks were also engaged by tank fire and artillery from the SS units.

Summary

The VVS and Luftwaffe strove to keep their operational tempos as high as possible on the second day of the battle despite poor weather, crew fatigue, losses, and battle damage. Deichmann's airmen flew 1,023 sorties and Seidemann's 1,686, for a total of 2,709. Rudenko's 16th Air Army flew 1,126 and to the south the 2nd and 17th Air Armies logged 1,278. The VVS air armies on both fronts strove to take the offensive, sending large formations to challenge the Luftwaffe, but the air superiority fight again went against them with a total of 18 German aircraft lost to 179 Soviet. The bulk of Rudenko's losses were to his fighters, 60 of the 91 total. Rudenko's 6th Fighter Corps lost 11 La-5s, ten Yak-9s, and four Yak-7Bs, and overall corps strength was reduced from 110 to 48 fighters in just two days. The 6th's 1st "Stalingradskiy" Guards Fighter Division's three Yak-1 regiments – the 53rd, 54th, and 55th – now only had a total of 26 fighters, less than the paper strength of a single regiment. Bomber and Shturmovik units had also suffered losses, with 15 Il-2s lost by the 2nd Guards Attack Division and another seven from the 299th Ground Attack. The 221st Bomber Division lost nine Bostons. In the south, the 2nd Air Army lost 28 fighters and 22 Il-2s, and the 17th 21 Il-2s and nine fighters.

Although Rudenko continued to receive reports that his pilots were downing large numbers of German aircraft, he had to face the reality of his own heavy losses. In two days, the 16th Air Army had lost 191 aircraft, mostly fighters. He desperately requested reinforcements, and a frustrated Zhukov gained Stalin's approval to shift the 234th Fighter Division from the 15th Air Army – a formation reserved for the future Operation *Kutusov* offensive against the Orel salient – to Rudenko. The 234th was a welcome reinforcement, but like most of Naumenko's 15th VA, had high numbers of inexperienced "foal" pilots in its ranks. While Deichmann had lost few aircraft, he remained concerned with his shrinking fuel reserves. Bomber sorties had already been reduced from 582 on July 5 to 164 on the 6th, and Deichmann's Stukas from 647 to 289. The continual pressure from the 16th Air

Soviet personnel inspect a lend-lease A-20 Boston being delivered to them in occupied Iran. The VVS had several day bomber divisions equipped with Bostons, known as B-3s in Soviet service, although the Luftwaffe's He 111s and Ju 88s outnumbered the Soviet day bomber force at Kursk. (© Corbis via Getty Images)

Army forced Deichmann to constantly keep fighters on patrol, and 1. Flieger-Division flew 317 fighter sorties on the 6th. The Luftwaffe again launched a heavier ground support effort than the VVS on both fronts. In the north, 1. Flieger-Division flew 289 Stuka, 164 bomber, and 93 Zerstörer sorties, while the 16th Air Army only managed 225 Il-2 and 122 bomber sorties. Seidemann's VIII. Fliegerkorps flew 1,356 close support sorties, including 793 Stuka, 323 bomber, and 240 ground attack.

July 7–11: stalemate in the north

For the next five days, Model's 9th Army would batter itself against the Soviet second defensive line, with the struggle concentrated on battles for the fortified villages of Teploye, Olkovatka, and Ponyri. During July 7, Rokossovsky attempted to reinvigorate his abortive counterattack from the day before, colliding with a renewed effort by Model's Panzer divisions to break through. The 16th Air Army's performance began to show improvement as Rudenko's men scrambled to restore and improve their radar guidance and control service. Tactically, Soviet leaders began to implement lessons from the first brutal days of aerial combat, attempting to launch larger attack formations and staggering escorting fighters in groups of four to six at various altitudes rather than confining them to one altitude. Rudenko directed that larger numbers of fighters be kept at alert at airfields ready to respond to German moves. Reinforcements were also at hand, as the 234th Fighter Division arrived from the 15th Air Army during the day.

Air operations in the north, July 5–11							
	July 5	July 6	July 7	July 8	July 9	July 10	July 11
16 VA Sorties	1,147	1,023	1,607	1,255	956	921	477
16 VA Losses	100	91	43	49	47	36	23
1. FD sorties	2,088	1,686	1,687	1,173	877	1,136	933
1. FD losses	18	11	8	2	8	7	3

German bombers from KG 51 and Fw 190s from JG 51 and JG 54 were in the air by 0500hrs to support the renewed 9th Army attack. Four hours later, with five separate German ground attacks repulsed by Rokossovsky's rifle divisions, Deichmann sent in a strike with KG 51's entire force of Ju 88s followed by 55 Ju 87s of StG 1 covered by 30 Fw 190s. The Yak-1s and Yak-9s of the 1st Guards Fighter Division intercepted and downed two of the Ju 87s, costing the Luftwaffe Captain K. A. Pape, the III/StG 1's commander and a veteran of 350 missions. Of the three waves of Stukas, only the third was able to deliver its bombs without interference from VVS fighters.

The 16th Air Army sent its own Il-2s and bombers into the attack, and the Shturmoviks again suffered losses. In its first mission of the day, the 574th Ground Attack Regiment was intercepted by 18 Fw 190s of I/JG 54, losing five of seven Il-2s. Rudenko ordered the Pe-2s of his 3rd Bomber Corps, held in reserve for the first two days of *Zitadelle*, into action along with the Bostons of the 221st Bomber Division. As the 47th Panzerkorps prepared to attack south towards Olkovatka, the Bostons hit the headquarters of the 2nd Panzer Division's 304th Panzer-Grenadier Regiment, killing the commander and his adjutant and destroying five tanks. To the east, the Soviets sent 120 bombers and Il-2s to strike a reported force of 150 tanks north of Ponyri, with the Il-2s attacking in three waves and claiming 34 tanks and armored fighting vehicles destroyed with their PTAB bombs. Despite these VVS sorties, overall 1. Flieger-Division still outflew the 16th with respect to close air support, with 582 Stuka, 454 bomber, and 123 Bf 110 Zerstörer compared to the VVS's 219 Il-2 and 235 bomber sorties.

A VVS Pe-2 crew prepares for a mission several months after the battle of Kursk. Unlike the Soviet fighter and Il-2 forces, Pe-2 units were employed less and took fewer losses during the defensive phase of the battle. The 16th Air Army used its Pe-2s in several large-scale raids with Bostons and Il-2s, with the Pe-2s using level- rather than dive-bombing techniques. (Sovfoto/Universal Images Group via Getty Images)

During the 7th, 1. Flieger-Division lost eight aircraft while the 16th Air Army lost 43, with Hubert Strassel adding another six kill claims to his tally. Despite these numbers, Soviet tactical improvements were having an effect. Although Rudenko lost 30 VVS fighters, their ability to protect the Shturmoviks and bombers was improving, and only nine Il-2s, three Bostons, and a Peshka were lost during the day. Luftflotte 6's Chief of Staff, General Friedrich Kless, pessimistically reported that the continuous nature of Soviet air operations was degrading aircrew readiness and availability, allowing the VVS to exploit the "spatial gaps" in Luftwaffe fighter coverage. Most worrying to Model, progress on the ground was minimal with gains of only 1–2km, and he sent the 4th Panzer Division from reserve to reinvigorate the attack. The Panzers of the 4th had to struggle forward through rain and mud during the night as the weather deteriorated.

Model was able to attack on July 8 with five Panzer divisions in the front line. In the air, the day began with an aerial ambush as Fw 190s from JG 51, vectored in by German signals intelligence, bounced 30 Il-2s of the 299th Ground Attack Division and their

Bombers at Kursk

Soviet Pe-2 and A-20 Boston bombers were less intensely utilized during the Kursk battle than Il-2s and fighters, and suffered fewer losses as a result. On July 10, however, 16th Air Army commander Rudenko launched a mass strike, targeting German forces massing for another attack on the key Soviet defensive positions around the town of Olkovatka. In all, 106 Pe-2s from the 3rd Bomber Aviation Corps (BAK) and 65 A-20 Bostons from the 221st Bomber Aviation Division (BAD) bombed from medium altitudes, while the 2nd Guards Ground Attack Division (GShAD) sent in 37 Il-2 Shturmoviks to attack below 10,000ft. The formation was escorted by fighters of the 6th Fighter Aviation Corps (IAK). General Afanasiy Karavatskiy, the commander of 3rd BAK, reported that the bomber strikes were made more effective by preceding Pe-2 reconnaissance sorties that helped identify targets. Unusually, 1. Flieger-Division did not intercept the attack, and despite heavy Flak fire, the attackers claimed to have destroyed 15 tanks, three other armored vehicles, 12 trucks, two Flak positions, and two ammunition dumps. While these claims were, like all those reported at Kursk, almost certainly high, the air attack likely aided in the Soviet repulse of attacks launched against positions held by the 2nd Tank Army on the 10th.

GRAHAM TURNER '24

Luftwaffe officers planning a mission. The German air force's excellent communications network, flexible planning system, and *flivo* liaison officers posted with army units at the front gave it a major edge over its Soviet opponents.(Nik Cornish at www.Stavka.photos)

15 fighter escorts, shooting down four Shturmoviks. Most of 1. Flieger-Division's 274 bomber, 73 Zerstörer, and 378 Stuka sorties of the day were dedicated to supporting another 47th Panzerkorps attack towards Olkovatka. The low cloud ceiling and thick battlefield smoke hindered the effectiveness of the strikes, and the German airmen only claimed to destroy five enemy tanks. The German fighter pilots flew 291 sorties on the 8th, and were still able to inflict disproportionate losses, at times launching surprise diving attacks out of the low clouds. Along with losses to Flak, the VVS lost 49 aircraft destroyed at a cost of only two Luftwaffe aircraft destroyed and nine damaged. Losses remained concentrated in the fighter and Il-2 forces, and the 16th Air Army's bombers suffered comparatively light losses. For the first four days of the battle, the 3rd Bomber Corps and 221st Bomber Division flew a total of 632 sorties, but only lost two Pe-2s and 19 Bostons, some to Flak. The toll on the fighters continued to be heavy, and 16th Air Army fighter sorties had declined from 817 on July 5 to 613 four days later.

One of 1. Flieger-Division's losses was Hubert Strassel, whose remarkable run of victories came to an end on the 8th. After shooting down three additional Soviet aircraft for his 65th, 66th, and 67th victories, his Fw 190 was hit by an "LaGG-3" – almost certainly a Yak – and he was killed when forced to bail out at low altitude and his parachute failed. Strassel had claimed a total of 30 victories in just four days of combat and was posthumously awarded the Knight's Cross. He may have been shot down by a Yak-7B piloted by Lieutenant Stepan Kolesnichenko of the 517th Fighter Regiment, an ace with 16 individual and four shared kills.

With minimal progress again on the 8th, Model was increasingly convinced that a stalemate was in the offing and distracted by the looming threat posed to his rear area by the Bryansk and Western Fronts. Kluge and Model met at the 47th Panzerkorps headquarters during the 8th, and although Model argued that a breakthrough was out of reach, Kluge insisted that assaults continued to wear down Soviet reserves. Model determined to launch a last major effort, but his divisions made only halting efforts to advance on the 9th. Rudenko sent the 3rd Bomber Corps with 110 Pe-2s and the 299th Ground Assault Division with 62 Il-2s to hit the area north of Olkovatka to strike the 47th's rear areas. Due to the heavy losses

to the 16th's fighters, Rudenko had to use the inexperienced 234th Fighter Division from Naumenko's 15th Air Army for the escort. The "foals" became lost in the cloudy conditions and failed to rendezvous with the Il-2s. The Pe-2s, however, were able to get through and deliver their bombs, although two were lost to Flak and six Peshkas, six Il-2s, and three fighters to Fw 190s on the return leg of the mission. The 4th Panzer Division reported losses to PTABs dropped by the Il-2s, including artillery and assault guns destroyed. The afternoon of the 9th brought heavy rain, allowing Deichmann to stand down for several hours and conserve fuel, although he mounted an evening raid with almost 100 He 111s of KG 4 and KG 53 to soften up Soviet positions for the next day's attack. Rudenko's airmen lost 47 aircraft during the day, including 20 fighters, 21 Il-2s, five Pe-2s, and a Boston. The VVS pilots continued to make exaggerated kill claims, reporting 52 Luftwaffe aircraft shot down when Deichmann only lost eight destroyed and two severely damaged.

Model began a last attempt to break through with an assault beginning at 0600hrs on the 10th. The 47th Panzerkorps, with three full Panzer divisions, attacked Teploye and Olkovatka, with the massed support of Deichmann's bombers and Stukas. The flying weather continued to be poor, but 1. Flieger-Division mounted 375 Stuka, 220 bomber, and 66 Zerstörer sorties in support, and claimed to destroy 11 tanks, ten other vehicles, and four artillery batteries. Deichmann sent his fighters out on aggressive sweeps to intercept their VVS opponents, and II/JG 54's Lieutenant Günther Scheel claimed to down three Airacobras from the 30th Guards Fighter Regiment over their airfield. Scheel would claim two other kills on the 10th, bringing his total to ten for the day.

Rudenko responded with another massed strike with bombers and Shturmoviks, launching 106 Pe-2s from the 3rd Bomber Corps, 65 Bostons from the 221st Bomber Division, and 37 Il-2s from the 2nd Ground Attack Division, all with fighter escort. In the face of heavy Flak, the bombers delivered their attacks from medium altitude and the 2nd Guards Attack Division's Il-2s below 900m. Fortunately for the Soviets, the German fighter response was limited. The Soviet airmen reported destroying 15 tanks, three other armored fighting vehicles, 12 motor vehicles, two Flak positions, and two ammunition dumps, and the strike resulted in a formal message of thanks to the airmen from the 2nd Tank Army commander.

Luftwaffe fighters continued to dominate their VVS opponents. The 16th Air Army lost 36 aircraft, including 26 fighters, seven Pe-2s, two Shturmoviks, and one Boston; Deichmann in turn lost two He 111s, two Bf 110s, and three Fw 190s. Despite their efforts, the 9th Army made limited progress. Olkovatka remained out of reach, although the 47th Panzerkorps attack had taken Tepolye – but only after an attack by three full Panzer divisions. More of Ponyri was seized by the 41st Panzerkorps, although Central Front units still held a portion of the town. During the evening, Model called a halt to offensive operations.

The VVS fighter pilots had been heavily outclassed in the air, and the losses were wearing on the surviving pilots' morale. The 16th Air Army had lost heavily, and despite the arrival of the 234th Fighter Division, its overall strength had declined from 1,151 total aircraft, 1,034 of them serviceable on July 5, to 945 total with 706 serviceable five days later. 1. Flieger-Division had lost or had written off due to damage possibly 80 to 90 aircraft during the same period. General-Major Andrey Yumashev, commander of the 6th Fighter Corps, was relieved on the 10th for not securing air superiority and replaced by General-Major Yevgeniy Yerlykin, who had led the 7th PVO (air defense force) Fighter Corps since 1941.

The exhausted 16th Air Army had a day of rest on the 11th, flying only 218 fighter, 80 Il-2, and three bomber sorties, while Deichmann launched 933 sorties to cover Model's transition to the defense. 1. Flieger-Division had seized de facto air superiority over the northern portion of the front, with Rudenko's airmen flying less than 100 sorties on July 12, although the initiation of Operation *Kutusov* that same day to the north would radically alter the situation. Another Luftwaffe veteran was lost, however, when Major Rudolf Resch, commander of IV/51 JG and a 94-victory ace, was shot down.

Since the beginning of *Zitadelle*, Rudenko had lost a total of 391aircraft, including 262 fighters, 90 Il-2s, and 39 bombers. Deichmann had lost about 57 aircraft destroyed and 34 damaged, far fewer than the 517 kills claimed by Soviet pilots. Despite its success in the air, Army Group Center's portion of *Zitadelle* had been unsuccessful, with Rokossovsky's Voronezh Front preventing the 9th Army from fully penetrating its defensive positions, albeit at a heavy cost in casualties and destroyed tanks. Model's troops had advanced 15km at the most, had not fully penetrated the Soviet defensive lines, and its most advanced forces were still about 52km from their ultimate objective, Kursk.

July 7–11: grinding progress in the south

Unlike Model's 9th Army, Army Group South made steady if grinding progress, with the II SS Panzerkorps advancing towards Prokhorovka and hoping once free of Soviet defensive lines to dash from there to Kursk itself. The massive air battles on July 5 and 6 had a major impact on the Soviet 2nd and 17th Air Armies, which sustained heavy losses. Krasovsky ordered his Il-2 regiments to fly in larger, more strongly escorted formations to reduce losses. Sudets stood down the 3rd and 9th Composite Air Corps of his 17th Air Army, and only his 1st Composite Air Corps remained in action, and his army's daylight sortie numbers would steadily decline as the offensive continued.

On the Axis side, during the evening of July 7, Seidemann received orders to transfer aircraft north to reinforce the struggling Army Group Center assault, but with Manstein's divisions clearly making more progress, delayed dispatching most of the units. Two groups of KG 3 bombers began moving to Army Group Center within a day, but StG 3 and the two groups of JG 3 fighters ordered north only arrived there after the beginning of the Operation *Kutusov* offensive against the Orel salient on July 12.

Given his number of aircraft and Luftwaffe doctrine for massing its efforts, Seidemann felt he did not have adequate striking power to support each of the three attacking Panzerkorps equally and faced difficult force allocation decisions. On the morning of July 7, he informed Army Detachment Kempf that it would only receive support from a single Stuka *Gruppe*, while he assigned the bulk of VIII. Fliegerkorps to Hoth's 4th Panzer Army attack. The 6th Guards Army soon reported II SS tank and infantry attacks coordinated with strikes by groups of 60–80 Luftwaffe aircraft arriving every five to ten minutes. The 2nd Air Army responded with its own Il-2s, now flying in larger formations. During the day, Erich Hartmann and three other Bf 109s from 7/JG 52 were surprised to spot one of these large formations, this one of 46 Il-2s from the 1st Ground Attack Division with a strong fighter escort, coming

A Bf 110 operating in late 1943. Like the Stuka, the Bf 110 was able to operate in a daytime strike role in the east due to the Luftwaffe's ability to provide good fighter cover as late as mid-1943. Fifty-eight Bf 110s, some specially modified for antitank operations, were assigned to a group of ZG 1 flying with Deichmann's 1. Flieger-Division. (Keystone-France/Gamma-Keystone via Getty Images)

in at 500m. The German fighters dove in to attack, with Hartmann and his wingman each shooting down two Shturmoviks. A total of five Il-2s and one La-5 were lost in the engagement along with Hartmann's wingman, who survived the crash with injuries. Eighty-two Il-2s from the 291st Ground Attack Division with 122 fighter escorts subsequently attacked the *Grossdeutschland* Panzer-Grenadier and 3rd Panzer Divisions, overwhelming the Luftwaffe fighter patrols and dropping over 10,000 PTAB antitank bombs. During the action, Lieutenant Fyodor Kitov of the attacking 617th Ground Attack Regiment was hit by antiaircraft fire and deliberately crashed into a German column in what the Soviets termed a "fire taran," a sacrificial action highlighted in many Soviet-era accounts of the battle. In total, the Shturmoviks claimed to destroy 20 German tanks.

Ninety-six Soviet aircraft were lost in action on the 7th. With strong Luftwaffe air support, both the II SS and 48th Panzerkorps were able to advance, although the SS divisions were still only 10–20km from the July 5 start lines. Krasovsky's larger, better-escorted Shturmovik formations proved effective and only 13 Il-2s were lost on the 7th. The 17th Air Army persisted in launching piecemeal attacks and JG 3 Bf 109s shot down 12 Il-2s from Sudets' 306th Ground Attack Division in 30 minutes, leading Sudets to halt attacks on the well-defended crossing sites over the Donets. Despite the huge claims of downed German aircraft reported by VVS pilots, VIII. Fliegerkorps only lost 11 aircraft to enemy action, along with another 11 damaged. A Hungarian Bf 109 F had to make a forced landing, but the Hungarians had scored one confirmed and four unconfirmed kills during the day. The Axis airmen were downing about five VVS aircraft for each one lost.

Air operations in the south, July 5–12								
	July 5	July 6	July 7	July 8	July 9	July 10	July 11	July 12
2 & 17 VA sorties	1,570	1,278	1,427	1,173	828	524	595	893
2 & 17 VA losses	186	88	96	61	46	25	19	31
VIII. FK sorties	2,387	1,686	1,829	1,686	1,621	682	1,039	654
VIII. FK losses	27	7	11	5	11	3	14	19

An Fw 189 "Owl" short-range reconnaissance plane active earlier in the war. During *Zitadelle*, the Luftwaffe conducted a number of short-range recon flights near the front, but did not identify the approach of 5th Guards Tank Army reserves from the Steppe Front as they approached Prokhorovka in the days before the climactic battle on July 12. (Keystone/ Getty Images)

Seidemann again concentrated support to the II SS Panzerkorps the next day. VIII. Fliegerkorps flew 701 Stuka sorties, with Stukageschwader 2 performing the bulk of the close support missions. Soviet resistance on the ground remained tenacious, and with Hauser's flanks still uncovered, Rokossovsky launched a renewed attack with the 2nd and 5th Guards Tank Corps against the II SS's right flank. Much like the battle two days before, VIII. Fliegerkorps Fw 190s were vectored in to strike the supporting Soviet infantry with SD 2 cluster bombs while the Hs 129s strafed the T-34 medium and T-70 light tanks with their 30mm Mk 103 cannon firing armored-piercing shells. Bf 109s kept Soviet fighters at bay and, facing only antiaircraft fire, German pilots reported destroying 40 to 50 Soviet tanks. Like the action on July 6, postwar accounts labeled this a battle where "an armored attack was totally halted from the air." The Luftwaffe reports of tank losses were, however,

almost certainly exaggerated, and the Soviet tank corps was simultaneously engaged by tank and artillery fire from the II SS.

VVS fighters registered a rare success during the 8th when nine La-5s of the 240th Fighter Regiment bounced a group of Ju 87s and downed five, with a sixth severely damaged. Overall, however, the experienced Luftwaffe pilots continued to outmatch their opponents, and on one of the last patrols of the day III/JG 52's commander, Hauptmann Günther Rall, flying with Erich Hartmann, engaged and shot down three "LaGGs" – probably the three Yak-1s reported lost by VVS. The VVS was, however, beginning to reduce its losses in air-to-air combat, cutting its losses by about half – 47 on the 8th opposed to 96 the day before. Luftwaffe support had helped propel Hauser's II SS Panzerkorps forward, but in the face of repeated Soviet attacks against his flank Hoth decided to deal with these before pushing on towards Prokhorovka, giving the Soviets time to move reinforcements to the area.

July 9 began with a rare, well-organized VVS aerial ambush of four III/JG 52 Bf 109s flying weather reconnaissance at 0300hrs. Three of the German fighters were shot down, and some of the pilots captured, bringing the III/JG 52's total losses since July 5 to 11 pilots and 16 Bf 109s. VIII. Fliegerkorps soon sent waves of Stukas, Ju 88s, and He 111s to strike Soviet defensive positions and the strong air support helped the 48th Panzerkorps finally force the 1st Tank Army back. The Panzers drove 10km north to link up with the II SS, helping to secure Hauser's left flank. The *Grossdeutschland* Division noted "outstanding" Luftwaffe support in its daily report.

The VVS in turn scored some successes, downing one He 111 and six Stukas, five from StG 2 "Immelmann." Lieutenant Ivan Kozhedub, who would end the war as the top-scoring Allied ace with 62 kills, had spent 1941 and 1942 as a flight instructor, but entered combat on July 5. He claimed his first two kills on July 6 and 7th, and on the 9th was leading his La-5-equipped squadron of the 240th Fighter Regiment after his commander was wounded the day before. Kozhedub spotted a pair of German fighters and engaged and shot down a Bf 109 for his third victory. The German fighter may have been flown by Luftwaffe ace Günther Rall, who was shot down that day. Kozhedub flew two more sorties during the 9th, claiming another Bf 109. Later in the day, Rall mounted a new Bf 109 and obtained his revenge when he and his wingman each shot down two Yak-1s of the 27th Fighter Regiment. All four of the Soviet pilots were lost, including the eight-victory ace Lieutenant Ivan Shpak and Major Aleksandr Volkov, the squadron commander.

The II SS drove north with its Totenkopf Division in the lead, and a brief opportunity opened for a dash towards Prokhorovka. The reinforcing Steppe Front's 5th Guards Tank Army was still on its approach march, traveling at night to avoid detection by the Luftwaffe. To the south, the 3rd Panzerkorps widened its bridgehead over the Donets, but the 17th Air Army supported the 7th Guards Army with 74 Il-2 sorties. Seidemann had few aircraft

A regiment of VVS Yak-7b fighters. Operation *Kutusov* added two additional Soviet air armies, the 1st and 15th, into action against 1. Flieger-Division defending the Orel area. While General Nikolai Naumenko's 15th had a high portion of inexperienced "foals," General Mikhail Gromov's 1st Air Army had a greater portion of experienced aircrews. (Sovfoto/Universal Images Group via Getty Images)

An He 111 that has managed to return to base with battle damage. The Luftwaffe Quartermaster Service reported 45 Luftflotte 4 and 6 aircraft destroyed during the six days of *Zitadelle*, as well as about the same number with moderate-to-severe battle damage. Unlike the quartermasters, operational Luftwaffe units tended to underreport losses to enemy action. (Nik Cornish at www.Stavka.photos)

available to cover Kempf's troops, and the Il-2s encountered few German fighters. The commander of the 25th Guards Rifle Division reported the Il-2s destroyed 47 German tanks. As with all such claims, these were almost certainly exaggerated, but as the 3rd Panzerkorps reported the destruction or damage of 108 tanks on July 8, some may have been lost to Il-2 attack.

For the first time, Luftwaffe aircraft losses approached those of the VVS on July 9. Forty-six Soviet aircraft were lost, but 28 German aircraft were put out of action, with 11 of these total losses. The five StG 2 Stukas lost were a warning signal of the increasing vulnerability of these slow aircraft in 1943 Eastern Front daylight operations. StG 2 had lost six Stukas on July 5, and StG 77 lost ten Stukas on July 6, and another six on July 8. Facing significant attrition, Seidemann began to use his Stukas more cautiously. The VVS losses on July 9 were the lowest of the battle to date, with 20 fighters, 15 Il-2s, and two bombers lost by the 2nd VA, and another nine aircraft lost by the 17th.

Flying weather was poor on July 10, and the day marked a significant downturn in VVS and Luftwaffe sorties with the Soviets flying 524 and the Germans 682. With Model's last attempt to break through in the north meeting failure the same day, any German hopes for a strategic result from *Zitadelle* rested with the II SS Panzerkorps' attack towards Prokhorovka. Morning rains delayed Hauser, but by 1000hrs his Panzers were underway, overrunning a brigade of the Soviet 10th Mechanized Corps blocking the road. Krasovsky launched a rare attack early on the 10th against two Luftwaffe airbases, with 48 Il-2s of the 266th and 292nd Ground Attack Divisions claiming to destroy a hangar at Kharkov-Rogan and two ammunition dumps at Mikoyanovka, at a cost of three Il-2s lost to Bf 109s on the return flight. The 5th Guards and 5th Guards Tank Armies arrived in the Prokhorovka area on the night of July 10/11, and Hoth had lost the opportunity to take the town on the run, but Hoth and von Manstein were unaware of the arrival of the Soviet reinforcements due to their strict radio discipline. Luftwaffe deep aerial reconnaissance had also missed the night march of the Steppe Front's armies.

OPPOSITE DRIVE TO THE DNEIPER

The Germans lost three aircraft with five additional damaged and out of commission on the 10th. The 2nd Air Army reported 25 aircraft lost; the 17th VA flew only 71 sorties and reported no losses. The VVS used July 10 to rotate some units out for rebuilding. The 205th Fighter Division was pulled back from the front, giving its remaining operational Yak-1s to the 737th Fighter Regiment and 256th Fighter Division. The 205th's 27th Fighter Regiment had lost 11 Yak-1s and eight pilots in five days. The 256th Fighter Division arrived to replace the 205th in the line with 96 fighters in its 91st and 32nd Fighter Regiments, including 53 Yak-7Bs and 43 new Yak-9s. The division was commanded by Colonel Nikolay Gerasimov, a veteran of combat in Spain, Manchuria, and Finland as well as against the Luftwaffe since 1941. Gerasimov was credited with 14 individual and ten shared victories.

As the weather cleared on July 11, Seidemann's bombers and Stukas returned to support the assault. VVS commanders decided to hold their Il-2 and bomber forces in reserve for the major counterattack planned for the next day, and only Soviet fighters rose to challenge the VIII. Fliegerkorps aircraft active over the front. Seidemann's airmen flew 1,039 sorties during the day, with 447 Stuka, 197 bomber, and 157 *Schlacht* sorties aiding the advance. The 2nd and 17th Air Armies flew 595 sorties in response. All three Panzerkorps made good progress, although Stukas mistakenly attacked the LSSAH's lead element, a Panzer-Grenadier battalion led by Major Joachim Peiper, despite the presence of a *flivo* air liaison officer traveling in an armored vehicle with Peiper's headquarters. The son of Hitler's foreign minister, Lieutenant Colonel Rudolf von Ribbentrop, commanded one of the Panzer units attacked by the Stukas. By the evening, the lead II SS division seized Hill 252.2, and from the hilltop SS officers could see Prokhorovka just a few kilometers away. Vatutin, concerned that von Manstein was on the verge of a breakthrough to Kursk, ordered the newly arrived 5th Guards Tank Army to launch an immediate counterattack the next morning.

July 12–16: Prokhorovka, *Kutusov*, and the end of *Zitadelle*

The bombers of ADD were all focused on preparatory strikes to support the Operation *Kutusov* counteroffensive in the north, but as throughout the battle, Krasovsky's and Sudets' night bombers remained active. U-2s from the 2nd Air Army's 208th Night Bomber Division flew 126 sorties to harass the SS divisions while Sudets' 262nd flew 183 farther south to disrupt rail communications. Following its normal pattern for night operations, the Luftwaffe launched seven bombers to hit rail stations and flew 49 *Storkampfgruppe* harassment sorties. The 5th Guards Tank Army with its 593 tanks and 37 self-propelled guns prepared to counterattack from the Prokhorovka area early in the day. Vatutin ordered his already engaged 1st Tank Army and the 2nd and 5th Guards Tank Corps to join in the attack, leading to a series of actions spread over the entire 25km front. The II SS advance the day before had overrun the 5th Guards Tank Army's planned assembly area, and it was rushed into a hasty attack without adequate provision for artillery or air support.

Both sides' air capabilities had been worn down by a week of intensive operations. Krasovsky had just over 500 serviceable aircraft available with 266 fighters, 96 Il-2s, and 140 bombers. Sudets' 17th Air Army was down to about 300 operational aircraft. Krasovsky ordered his 1st Bomber Corps and 1st Ground Attack Corps to support the 5th Guard Tank Army's attack against the II SS Panzerkorps, while the 291st Ground Attack Division would back the 1st Tank Army as it engaged the 48th Panzerkorps. Army Detachment Kempf would be left to Sudets' 17th Air Army. VIII. Fliegerkorps was also exhausted and, unaware of the looming Soviet counterattack, flew the fewest number of sorties on the 12th of the

Front line July 1943
Front line December 1943
1. Operation Kutusov, July 12 to August 18: The Soviet Western and Bryansk Fronts begin Operation Kutusov against the Orel salient supported by the 1st and 15th Air Armies, joined three days later by the Central Front and 16th Air Army. Luftflotte 4 sends reinforcements to Luftflotte 6.
2. July 17 to August 2: The First Donbas Strategic Offensive: Soviet Southern and Southwestern Fronts supported by the 8th and 17th Air Armies attack Army Group South but are repulsed.
3. August 3–23: The Soviets launch Operation Rumyantsev, aimed at retaking Kharkov and Belgorod. The Voronezh and Steppe Fronts attack with air support provided by the VVS's 2nd and 5th Air Armies.
4. August 13 to September 23: The Second Donbas Strategic Offensive. The Southwestern and Southern Fronts launch a renewed offensive across the Miius River, again supported by the 17th and 8th Air Armies.
5. By September, von Manstein's entire front is being forced off his defensive lines and back towards the Dnieper River.
SOVIET UNION
Kalinin
Western
Bryansk
Orel
Central
Voronezh
Steppe
Belgorod
Kharkov
Kursk
Kiev
Poltava
Kempf
Cherkassy
Dnepropetrovsk
Zaporozhe
Krivoi Rog
Uman
Zithomir
Minsk
Vitebsk
Smolensk
Moscow
Rzhev
Kalinin
Gomel
Pripiat
Dnieper
Desna
Berezina
Volga
Don
Donets
Southern Bug
Dnestr
Kishinev
Odessa
Sevastopol
Black Sea
Sea of Azov
Rostov
Voroshilovgrad
Stalino
Krasnodar
Novorossisk
Nord
Mitte
Süd
1 Ukrainian
2 Ukrainian
3 Ukrainian
4 Ukrainian
Belorussian
Western Belorussian
Bryansk
Central
Voronezh
Steppe
South-western
Southern
North-Caucasus
A
3 VA
1 VA
15 VA
16 VA
2 VA
5 VA
17 VA
8 VA
0 100 miles
0 100km
N

Crewmembers pose in front of their B-3 Boston light bomber. Three thousand lend-lease A-20 Havocs/Bostons were sent to the USSR during the war, making it the biggest user of the bomber during the war. The platform was used in multiple roles in addition to bomber, including reconnaissance and, with Soviet Naval Aviation, as a torpedo bomber. (Sovfoto/ Universal Images Group via Getty Images)

first seven days of *Zitadelle*. With his Stukas operating on a more limited scale, Seidemann relied on the ground attack aircraft of SchG 1 and its subordinate *Panzerjägerstaffel*/SchG 1 to support the II SS attack towards Prokhorovka and sent his He 111s and Ju 88s to support the 3rd Panzerkorps' push north on the eastern side of the Donets.

The weather was poor during the early morning hours, with thick, low-hanging clouds. Krasovsky delayed operations and the crews of 70 Pe-2s were ordered out of their planes at 0330hrs right before take-off. Seidemann was less cautious and launched Bf 109 fighter sweeps. Air operations began in earnest around 0600hrs, with groups of Il-2s from 1st Ground Attack Corps conducting low-level attacks on II SS Panzerkorps and returning without loss. Bomber strikes by both the VVS and Luftwaffe followed, with a large formation of 1st Bomber Corps Pe-2s hitting the II SS Panzerkorps' rear areas. With the smoke from previous strikes obscuring the area, many of the Pe-2s dove down to identify and hit their targets.

For the first time, the 2nd and 17th Air Armies would outfly the Luftwaffe on the Southern Front, with 893 sorties to 654. The VVS, however, concentrated its activities after the morning Shturmovik and bomber strikes on the II SS on the German flanks, while Seidemann focused his *Schlacht* attack aircraft to support Hauser's SS Panzers. Over the 48th Panzerkorps, the Il-2s of Colonel Andrey Vitruk's 291st Ground Attack Division met little resistance in the air. On von Manstein's eastern flank, Sudets' 17th Air Army flew 134 sorties against Army Detachment Kempf's 3rd Panzerkorps. Kempf's forces were also accidentally struck by friendly bombers when 12 He 111s bombed the 6th Panzer Division, wounding the division's commander and killing the commander of the 114th Panzer-Grenadier Regiment. The 6th had captured a bridge the night before in a dash forward led by a captured T-34, but the attached *flivos*' SdKfz 305 truck had broken down, and word of the advance had not reached VIII. Fliegerkorps.

As a result, the II SS Panzerkorps faced the 5th Guards Tank Army's counterattack with little support on its flanks. As the Soviet tank brigades charged over two miles of open terrain, they faced deadly long-range fire from the II SS Panzerkorps tanks and guns, while Hs 129s, Fw 190s, and Ju 87s operated overhead. StG 1 and *Panzerjägerstaffel*/SchG 1 flew 248 sorties

A formation of Ju 88 bombers over the Eastern Front in 1942. Ju 88s operated during *Zitadelle* with Luftflotte 4 and 6. Ju 88s served in both level- and dive-bombing roles during the battle, along with a smaller number of reconnaissance and night fighter variants. (ullstein bild via Getty Images)

during the 12th, almost all in direct support of II SS and guided in by radio from Luftwaffe liaison officers on the ground. Although the Stukas only managed 150 sorties, Hauptmann Hans-Ulrich Rudel, the *Staffelkapitän* of I/StG 2 "Immelmann," reported destroying 12 Soviet tanks with the two 37mm cannon on his Ju 87 G. The number of Soviet tanks lost to air attack is uncertain, but the commander of the 36th Tank Brigade, Colonel Mitroshenko, was seriously wounded when his lend-lease Churchill tank was knocked out by Luftwaffe attack. The 5th Guards Tank Army's hasty planning had not adequately provided for air support, and the Luftwaffe only encountered a few scattered VVS fighters over the main battlefield at Prokhorovka. Soviet antiaircraft fire was effective, however, and 11 Hs 129s from SchG 1 and *Panzerjägerstaffel*/SchG 1 were put out of action, six of these total write-offs.

The weather deteriorated during the afternoon, reducing air activity. The 1st Bomber Corps' Pe-2s were able to attack elements of the II SS around 1400hrs without loss, although the Soviet attack had already been brought to a halt and the 5th Guards Tank Army had taken up defensive positions. Towards 1600hrs, Il-2s trying to attack Army Detachment Kempf's 3rd Panzerkorps were intercepted by a JG 3 *Rotte*, and in three minutes First Lieutenant Ernst-Heinz Löhr shot down three Shturmoviks, while his wingman downed another. At 1600hrs, in the last air-to-air engagement over Prokhorovka, Captain Günther Rall of III/JG 3 and his wingman engaged some La-5s. In the combat, Rall misjudged the distance and collided with his target but was able to crash land.

The Luftwaffe had been able to dominate the air over the climactic tank battle at Prokhorovka. Poor weather and smoke from burning tanks made it difficult for Soviet commanders to see what was going on, limiting VVS awareness of the situation on the ground. The Soviets again found it difficult to flexibly adjust to developments, keeping to plans made hours before, and without good forward air-ground liaison capabilities could not differentiate friendly and enemy forces at the front. 1st Ground Attack Corps Il-2s with fighter escort arrived at the front around 1000hrs, but rather than engage in the battle near Prokhorovka struck vehicle convoys and artillery positions 16km behind the front.

The counteroffensive by Rotmistrov's 5th Guards Tank Army was able to blunt the II SS Panzerkorps' attack and force it on the defense, but at a huge cost. As many as 159 Soviet

tanks were lost, largely to long-range fire from the SS tanks, at little cost to the Germans. The Luftwaffe reported 19 aircraft put out of commission during the day to 31 VVS. Air engagements were rare, and only one German aircraft, a Ju 52 flying out wounded, was reported lost to a Soviet air attack, and VIII. Fliegerkorps only claimed to shoot down 16.

Kutusov begins

July 12 was also a decisive day in the north. With Model's 9th Army now on the defensive, the Soviet high command decided that the time was ripe to launch Operation *Kutusov* against the Orel salient. The Bryansk Front would launch the main offensive against the salient's eastern front, while the Western Front's 11th Guards Army attacked from the northwest. Rokossovsky's Central Front would join in from the south when it had sufficiently recovered from its defensive battle. The defending 2nd Panzer Army consisted primarily of infantry divisions, but German forces had held the salient since 1941, and it manned deep and sophisticated defensive lines. The Bryansk Front was supported by General Nikolai Naumenko's 15th Air Army with about 1,000 aircraft, and the Western Front's 720-aircraft-strong 1st Air Army was commanded by General Mikhail Gromov. The bombers of Long Range Aviation supported *Kutusov* with its entire available force, and ADD Commander General-Major Aleksandr Golovanov would even use his Il-4 medium bombers in rare daylight attacks. Photo reconnaissance had been underway since May, allowing planners to assemble detailed information on potential targets. Air Force Commander-in-Chief Novikov arrived at the 15th Air Army headquarters on July 12 to coordinate air support for the offensive.

The 1st and 15th Air Armies outnumbered Deichmann's 1. Flieger-Division by almost three to one, and when the Central Front's 16th Air Army joined the attack several days later, the VVS's quantitative advantage would increase further. Three of the 15th's regiments were equipped with Yak-9Ts with 37mm cannon mounted in the nose to increase its antitank capabilities, but many of the Soviet aircraft were biplanes of the night bomber divisions, which amounted to about 25 percent of the 15th Air Army's order of battle, and the 15th Air Army had recently had an influx of large numbers of inexperienced and inadequately trained pilots. Roughly 80 percent of Naumenko's airmen had not yet flown a combat sortie, and the army command staff was also inexperienced. As the VVS pilots still faced great odds when engaging the veteran Luftwaffe aircrews, the offensive was preceded by ceremonies presenting Guards titles and banners to various regiments to shore up morale.

A captured Henschel Hs 129 B-2 ground attack aircraft being studied by the US in 1946. The photo clearly shows where the 7.92mm machine gun and 20mm cannon were mounted, one each on both sides of the cockpit. For *Zitadelle*, most Hs 129s had a Mk 103 30mm cannon mounted directly under the fuselage to improve their antitank capability. (USAAF/ Wikimedia)

The Soviets ceremonially bestowed the title "Guards," along with Guards banners to VVS regiments in an effort to improve morale in the largely inexperienced 15th Air Army before the beginning of Operation *Kutusov*. (Courtesy of TASS)

Kutusov began with a night of intensive Soviet bombing raids. In addition to the U-2s, ADD bombers flew 360 sorties against the eastern flank of the salient while another 182 ADD sorties hit the German defenses opposing the Western Front. The offensive began at dawn with a heavy Soviet artillery barrage and intense airstrikes, followed by Il-2s laying smokescreens to blind German positions as Soviet tanks and infantry began the assault. The airmen of 1. Flieger-Division had only had a brief one-day respite after Model's 9th Army shifted to the defensive, but their morale was high after their successes against the 16th Air Army. In a replay of July 5, the veteran Luftwaffe fighter pilots repeatedly engaged Naumenko's inexperienced Soviet airmen, who often scattered when attacked, to be picked off by pursuing Fw 190s. German leaders dismissed the Western Front's 11th Guards Army's attack as a diversion, and Deichmann concentrated his aircraft over the eastern side of the salient.

Although the day was cloudy with periodic rain showers, 1. Flieger-Division flew over 1,000 sorties in support of the 2nd Panzer Army. Groups of 30–50 bombers and Stukas launched repeated attacks on the attacking Soviet armies, reporting 35 tanks, 50 motor vehicles, and 14 artillery pieces knocked out. The 15th VA flew 737 sorties, 406 by fighters, 182 by Il-2, and 89 by bombers, but was unable to cope with Deichmann's Fw 190s. The 1st Guards Fighter Corps alone lost 25 aircraft and 19 pilots during the day. The Bryansk Front's attack bogged down about 5km into enemy territory, but facing much less opposition, the Western Front's 11th Guards Army drove 11km south during the day, supported by 868 1st Air Army sorties. Deichmann only sent 74 sorties to deal with what was regarded as a purely diversionary attack. The day's operations cost the Germans ten aircraft, while Naumenko's 15th Air Army lost 45 aircraft and Gromov's 1st 14.

Model reacted to *Kutusov* rapidly, sending three 9th Army Panzer divisions north. Air reinforcements were also soon on the way, including the last Luftwaffe fighter units in the Leningrad area, and Deichmann had a total of eight fighter groups by the 13th. The day saw

I. Fliegerkorps forced to fill a true "fire brigade" role, shifting its aircraft repeatedly between the northwestern and western portions of the salient as the Bryansk Front continued to attack and Model now realized the threat posed by the Western Front's 11th Guards Army attack. The Soviets lost 94 aircraft during the day, 50 of them Il-2s. 1. Flieger-Division in turn lost 20 aircraft including nine Fw 190s, with five of the pilots killed or missing and two injured, mostly to Gromov's more experienced 1st Air Army. Cumulative losses, battle damage, and maintenance problems were grinding the Germans down. JG 51 had 40 percent of its strength – 50 Fw 190s – put out of action in the nine days since the start of *Zitadelle*. As the Central Front readied to join the offensive from the south, it was clear that 1. Flieger-Division would need additional augmentation to face attacks by three fronts, their air armies, and the bombers of ADD, and additional fighters and *Panzerjäger* aviation units were dispatched north from VIII. Fliegerkorps.

The end of *Zitadelle* in the south

Hitler called von Kluge and von Manstein to his *Wolfsschanze* headquarters in East Prussia on July 13. Model's 9th Army assault had already been halted and Model was shifting his Panzers north to meet Operation *Kutusov*, and the Soviet Southwestern and Southern Fronts were massing for attacks south of Kharkov. Hitler was concerned that the Allied Operation *Husky* landings in Sicily would cause Italy to leave the war and ordered a formal halt to *Zitadelle*. The Führer wanted Hauser's Panzerkorps transferred to Italy, where he felt the SS troops' political indoctrination would steady his ally. Von Manstein protested, convinced that his advance towards Prokhorovka could still yield strategic results, and Hitler agreed to allow a few more days for local offensive operations.

A formation of earlier model Ju 87 B-2s, probably used by the air element of an Axis ally, flying in early 1943. After Kursk, Luftwaffe fighters began to lose the ability to cover the Ju 87s, and *Zitadelle* saw the last massed use of Stuka formations. By 1944, the surviving Stukas were increasingly dedicated to night operations. (Roger-Viollet via Getty Images)

Von Manstein launched a converging attack with the II SS and 3rd Panzerkorps to pinch off the small salient between them held by the Soviet 69th Army, still hoping that a local success could open the door to a renewed advance. VIII. Fliegerkorps was able to mount a large effort in support, flying 1,452 sorties on July 14, including 510 Stuka, 486 bomber, and 175 *Schlacht* – the largest number of He 111s and Ju 88s sent aloft by Seidemann since July 8. The gap was closed by German forces on the 15th but most of the 69th Army was able to escape north. The cost in experienced pilots to the Luftwaffe continued, with Hans Werner, the 8/StG 77's commander; and Günther Schmid, commander of 5/StG 2 and a Knight's Cross holder who had flown 700 missions, both killed. The 2nd and 17th Air Armies lost a total of 27 aircraft, and VIII. Fliegerkorps lost nine destroyed and nine with severe damage.

The next week saw Army Group South begin to withdraw, and VIII. Fliegerkorps steadily weakened by the need to dispatch reinforcements to the north and south. All its tank hunting and many of its *Schlacht* attack aircraft were sent to augment Luftflotte 6, now embattled resisting Operation *Kutusov*, and other units to the south when the Soviet Southern and Southwestern Fronts began offensives across the Mius River on July 17. Seidemann managed 499 sorties on July 16 but faced 926 from the 2nd and 17th Air Armies. Outnumbered, the Luftwaffe airmen were in the unusual situation of ensuring strike packages had strong fighter escorts and timed most of them for early mornings or late evenings to try and avoid VVS fighters. Seidemann flew 138 sorties on the 17th, facing 484 from the 2nd Air Army alone, and by the 19th could only manage 92. On July 23, only four Luftwaffe aircraft flew over the front as the Voronezh Front reoccupied the devastated positions they had held at the start of *Zitadelle*.

Aftermath

Kutusov concludes

Model soon took command of the 2nd Panzer as well as his own 9th Army, and, with Rokossovsky's Central Front now joining the offensive, he began to prepare the *Hagenstellung* (Hagen Position) at the base of the salient for the inevitable retreat. Due to the crisis, Luftwaffe high command reinforced Deichmann with another 200 aircraft, allowing 1. Flieger-Division to battle its VVS opponents to a standstill. The Soviet offensive remained clumsy, and Zhukov resorted to ordering frontal attacks by all three of his fronts, allowing Model to shift his Panzers to slow each in turn. On July 26, Hitler authorized the evacuation of the salient, and Soviet forces retook Orel on August 5. Around 3,000 Ju 52 sorties flew out German wounded and supplies during the retreat. The cost of the offensive had been heavy, with 429,890 Soviet casualties and the loss of 2,586 tanks and armored fighting vehicles. In the air, the VVS flew 60,995 sorties during the offensive, dropping 15,000 tons of bombs, while Deichmann's reinforced division flew 37,421 sorties. *Kutusov* cost the Soviets 1,104 aircraft while the Germans lost 199.

Operation *Rumyantsev*

Having much of his VIII. Fliegerkorps sent north to oppose Operation *Kutusov*, the Axis relied on the Hungarian Air Brigade's 45 aircraft and the small numbers of aircraft controlled by I. and IV. Fliegerkorps in the south to deter Soviet attacks. The Stavka, however, was ready by the beginning of August to launch a second major offensive, Operation *Rumyantsev*, to capture Belgorod and Kharkov. Vatutin's refurbished Voronezh Front, with a refitted 1st Tank and 5th Guards Tank Armies as the exploitation force, would be joined by the Steppe Front for the offensive. The attack force contained 2,439 tanks and self-propelled guns and almost a million troops, faced by only 210,000 men and 250 German tanks and assault guns. Krasovsky's 2nd and Goryunov's 5th Air Armies supported

Fw 190s at an airfield in the east. After *Zitadelle*, pressure from Italy and the western bomber offensive against Germany left fewer resources available to send to the Eastern Front, despite the pressure of incessant Soviet offensives in late 1943 and 1944 that steadily drove the front back towards the Reich.(Nik Cornish at www.Stavka.photos)

the offensive with 1,450 combat aircraft. Goryunov's 5th had served as a theater reserve during *Zitadelle*, and still contained a high proportion – roughly 50 percent – of "foals."

Rumyantsev demonstrated improved Soviet offensive techniques on the ground and in the air. Infantry armies backed by tank brigades broke through the enemy front lines as the offensive began on August 3, followed by the 1st Tank and 5th Guards Tank Armies surging through the gap to exploit. The tank armies advanced 22km on the first day and captured Belgorod on August 5. The air armies massed airpower in the key breakthrough sectors and used radar and dedicated radio networks to improve the control of fighter and strike forces. Von Manstein rushed Panzer divisions to seal the breach, and the Luftwaffe used similar "fire brigade" tactics to reinforce VIII. Fliegerkorps with aircraft now pulled from Deichmann to the north along with Pflugbeil to the south. The Panzers and 1,000 sorties a day from Seidemann slowed the Soviet advance, but by August 20 German columns were spotted retreating from Kharkov, which fell the next day. The VVS had flown 28,265 sorties during *Rumyantsev* and suffered the loss of 153 aircraft.

Drive to the Dnieper

The Soviet high command kept up pressure all along the front in Ukraine during August and September. On July 17, the Southern and Southwestern Fronts supported by the 8th and 17th Air Armies attacked Army Group South elements, holding the front south of Kharkov, but German Panzer reserves were able to contain the Soviet advance. On August 18, the Southern Front launched a renewed offensive across the Mius River, supported by General Timofey Khryukin's 8th Air Army. Pflugbeil's IV. Fliegerkorps along with the 95 aircraft of the Romanian Air Corps supported the Army Group South defenders. Again, von Manstein was able to pull Panzer divisions out of the line and send them to block the new thrust, but by late August his forces had been pried from their fortifications and river lines all along the front. By September, Army Group South was in full retreat to the Dnieper River, and the pursuing Red Army was able to establish a number of bridgeheads before the Germans could consolidate their defenses.

ANALYSIS

A regiment of Yak fighters and pilots ready for action. The Soviet fighter force took the majority of losses during the battle for Kursk but was able to reduce losses to the VVS's Il-2s and especially its bomber regiments. VVS fighter operations began to improve later in the battle, with many of the hard-won lessons of Stalingrad and the Kuban put into effect. (Sovfoto/ Universal Images Group via Getty Images)

Zitadelle was the Luftwaffe's last major offensive and tactical success in the east. The VVS had made steady improvements in organization and aircraft quality since the massive defeats of 1941, but the veteran German pilots were able to inflict heavy losses on their often poorly trained and inexperienced opponents. The Luftwaffe's bombers and Stukas provided powerful support to the attacking Panzers but faced sustained VVS resistance in the air. Ultimately, the Panzer divisions were unable to achieve a breakthrough in the face of the deep Red Army defensive zones and large reserve forces despite the Luftwaffe's strong support from the air.

While early Soviet accounts of the battle repeated their pilots' inflated kill claims and asserted that the VVS seized air superiority after the first few days of *Zitadelle*, in the critical first six days of the offensive the Luftwaffe outflew the VVS with 20,510 to 14,701 daytime sorties, and the Soviets lost 910 aircraft at a cost of only 125 German. The battered 17th Air Army's participation in daylight operations declined after the first few days, although its night harassment bombers remained active, while in the north the 16th was almost driven from the skies by July 12. While dominating its opponents in the air, the Luftwaffe also devoted many more sorties to close air support missions than the VVS, and its superior air–ground command and control system ensured that the strikes were more effective. Despite its heavy losses, however, the VVS continued to challenge and complicate Luftwaffe operations throughout the battle.

The air battle

Despite both Luftflotten flying fewer fighter sorties than the VVS, the veteran *Jagdflieger* achieved extremely high kill ratios at Kursk, particularly in the early days of the air battle. The resulting cost to the VVS was high, with the 16th, 2nd, and 17th Air Armies losing 910 aircraft during the Kursk defensive phase to the Luftwaffe's 125. Shturmovik pilots averaged the completion of six missions before being killed or wounded and fighter pilots

One of the German Ferdinand self-propelled antitank guns employed in the *Zitadelle* offensive. Although claims by pilots of both sides of numbers of tanks destroyed by air attack were exaggerated, at least one of the heavy and well-armored Ferdinands was disabled by a PTAB shaped-charge bomb that hit the engine compartment. (Nik Cornish at www.Stavka.photos)

15, but at Kursk many were lost during their first or second mission. After the losses of the first two days, the VVS launched a lessons-learned effort. Commander-in-Chief Aleksandr Novikov dispatched inspection teams to the front to interview pilots and commanders, discovering that many of the lessons learned at high cost at Stalingrad and over the Kuban had not been put into effect at Kursk. Soviet fighter operations, the surveys indicated, were too rigid and defensive. Patrols were assigned fixed sectors, allowing the Luftwaffe to overwhelm them or to exploit gaps. On strike operations, VVS fighters escorted Il-2s or bombers at set altitudes, giving the enemy the initiative. The ground control radio stations were too far from the front line, had poor radio discipline, and were manned by junior personnel without the authority to direct aircraft. As a result, VVS commanders far to the rear tried to control operations without current information or good communications with the front. Last, commanders were more interested in being able to report high sortie numbers rather than performing the needed mission planning and preparation to make the operations useful.

Novikov directed immediate adjustments to VVS operations. Fighter commanders were ordered to man forward command posts to directly control operations. Radio control was improved to vector fighters into combat, and VVS patrol areas extended into German-held territory. Fighter and Il-2 or bomber units were assigned to one another for repeated missions to improve communication, trust, and cohesion. More flexible fighter operations emulating the Luftwaffe "free hunt" missions were encouraged. Lastly, emulating the Kuban experience, the VVS renewed its emphasis on massed strikes.

Some accounts of the battle posit that Novikov's directive led to the reduction in VVS losses after the first few days of the battle, but many corrective measures were probably

undertaken at the air army level and below. After the initial days' losses, Rudenko and Krasovsky ordered the use of larger Il-2 strike formations and the operating of fighter escorts at various altitudes. Soviet aircraft losses also likely declined not due to improved tactics, but increased caution on the part of VVS pilots shocked by the heavy losses of the first few days of combat. In the midst of the battle, the commander of the 274th Fighter Division reported to his superiors that high losses had led VVS pilots to fly their patrols behind the front line to avoid enemy Flak and fighters, leaving the ground forces unprotected. Rudenko raged that such behavior "dishonored the Soviet fighter force" and threatened penal battalions or execution.

Air-to-ground operations

The Luftwaffe devoted a much greater portion of its sorties to close air support than the VVS throughout the battle. The bulk of VVS sorties were flown by fighter units, with fewer by Il-2s, and bombers used selectively. The 1944 Soviet General Staff study of the air battle estimated that in the 16th Air Army, for the first eight days of *Zitadelle*, each operational Il-2 flew an average of six sorties in total, not even one sortie per plane a day, and each bomber only four, while some German ground attack aircraft flew four to six sorties each day. Problems with the VVS air–ground command and control system and the lack of air liaison officers posted forward meant that the Soviet close air support sorties conducted were unlikely to be effectively coordinated with ground operations and were often directed to general areas of enemy activity and served as harassment raids. The VVS also made special efforts to attack tanks – very difficult targets to destroy – while other targets such as "soft" vehicle convoys were a lower priority. In contrast, the Luftwaffe's veteran pilots, aircrew, and command personnel had perfected the control of close air support to troops at the front, and some units, in particular mechanized divisions, had *flivos* accompanying forward elements to rapidly call in strikes. As was typical during the war, however, experienced pilots and personnel could limit but not eliminate instances of "friendly fire" air attacks, such as the accidental bombing of the command staff of the 6th Panzer Division on July 12.

The famous Stuka tank-killing ace, Hans-Ulrich Rudel, photographed in January 1943. Rudel flew the Ju 87 G with underwing 37mm cannon pods and reported destroying 12 Soviet tanks in one day during *Zitadelle*, likely referring to July 12. Although its armament could penetrate enemy tanks' weaker side and rear armor, the Ju 87 Gs were vulnerable to ground fire during their low-level attack runs. (PhotoQuest/Getty Images)

In the end, the Luftwaffe's Stukas and bombers could not tip the balance. Soviet forces fought much of the battle from well-dug-in positions, limiting the impact of German air attack, and even with excellent air support the attacking Panzers and infantry still faced multiple lines of minefields, antitank ditches, and strongpoints with dense concentrations of antitank guns and tanks. Soviet artillery was plentiful, well-camouflaged, and dug in while the attacking German divisions had inadequate artillery and engineering support. The new Ferdinand tank destroyers proved too heavy and vulnerable to mines in offensive operations, and the new Panther medium tanks, of which much was hoped, suffered from extensive teething problems. Muddy conditions hindered German cross-country movement. In the south, ravines and small rivers complicated German attacks, while in the north Model's troops

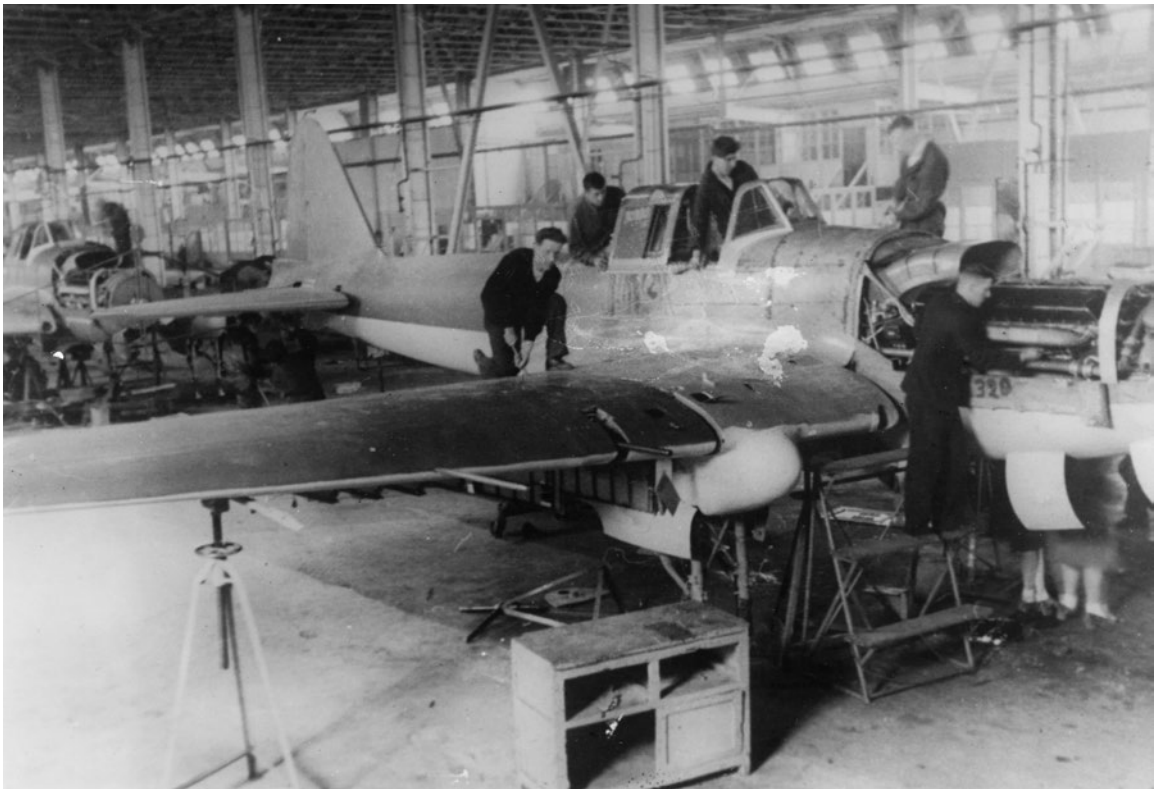
Hans-Ulrich Rudel's Ju 87 G-1 in May 1944. Rudel continued to fly the G model into 1945. On February 9, he destroyed 13 Soviet tanks in an action near the Oder River, but lost his leg when his Stuka was damaged by Soviet antiaircraft fire. Rudel returned to the air in March, eventually flying to the Prague area to turn himself over to the Allies. An unrepentant Nazi, Rudel emigrated to Argentina after the war. (Public domain/ Wikimedia)

struggled to overcome fortified villages and towns such as Olkovatka, Tepolye, and Ponyri. Even when the deep lines of defense were finally penetrated, as at Prokhorovka, the Soviets had a large reserve force, the Steppe Front, with masses of armored units to halt any breakthrough.

The limitations of Luftwaffe air-to-ground capabilities at Kursk were reflective of those of air support throughout World War II, a conflict in which air forces typically served as a powerful force-multiplier for ground operations but could not on their own deliver enough firepower to allow a decisive penetration of a strong enemy defensive line. Even the extraordinarily numerous and capable western Allied air forces, operating with complete air superiority in France and Germany in 1944 and 1945, could only rarely concentrate enough force for such an effect. Several efforts to use massed Allied airpower in Normandy were unable to achieve a breakthrough, notably during Operation *Goodwood*. In contrast, to initiate their Operation *Cobra* offensive, the Allies employed almost 3,000 aircraft, half of them strategic four-engine bombers, to drop 4,700 tons of bombs on a narrow sector of the Normandy front in 45 minutes. Unlike the deep, well-entrenched Soviet defenses at Kursk, the German lines on July 25 were thin, manned by units that had suffered heavy attrition, and lacked reserves, resulting in a rare US breakthrough and exploitation largely attributable to air support.

Tank-killing from the air

Operation *Zitadelle* featured efforts by both Luftwaffe and VVS airmen to improve their capabilities against enemy armor, but the high numbers of tanks destroyed claimed by the pilots – in many cases more than the targeted unit lost to all causes during the day, or in some instances more than was in the unit's full order of battle – are almost certainly



A Soviet factory producing Il-2 Shturmoviks. The USSR's aviation industry was able to replenish the VVS's air armies after their heavy losses at Kursk, and aircraft and pilot training and experience levels improved in late 1943 and 1944. Facing the threat posed by the western Allies' well-equipped air forces, the Luftwaffe was increasingly overwhelmed in 1944, and ever-fewer assets were allocated to the east. (Nik Cornish at www.Stavka.photos)

exaggerated. The Soviets issued the new PTAB shaped-charge antitank bomblet to its Il-2 units just before the battle, resulting in numerous claims of tanks knocked out with the new weapon. The PTAB could be effective even against the latest German tanks, and a Soviet study of the battlefield assessed that one of the massive Ferdinand self-propelled tank destroyers was disabled by a PTAB that penetrated 20mm of armor to ignite the vehicle's fuel, and one of the new Panthers was destroyed by a PTAB penetrating 45mm of armor near the tank's main gun. It is likely, however, that the mostly inexperienced Shturmovik pilots had difficulty effectively employing the new weapon in the early days of *Zitadelle*, especially given the deadly effectiveness of German fighters and Flak. The PTABs were certainly lethal when delivered against trucks and other soft targets, but their capabilities against armor, even when effectively delivered, could be limited. In a case study from 1944, only one of 31 Panther tanks discovered knocked out on the road to Belgrade could be attributed to PTAB hits.

Similarly, many of the Soviet tanks claimed as destroyed by cannon fire from Ju 87 Gs and Hs 129 Bs may have been generating smoke with their engines to escape attack. Deichmann reported destroying 74 enemy tanks of the 2nd Tank Army during the first six days of the operation from the air, but Soviet reports only attributed nine of 138 lost by the 2nd to air attack. Similarly, Seidemann reported 116 tanks destroyed during July 7–8, but a comprehensive review by one of the major Soviet formations, the 1st Tank Army, attributed only ten of 530 tanks lost to airpower, although it is likely that a portion of the many recorded simply as "burned" may have been hit at some point from the air. In the famous actions by Hs 129s and Fw 190 fighter bombers engaging the Soviet 2nd Guards Tank Corps on July 6 and 8 – claimed in some accounts as instances of tank attacks being stopped by airpower alone – the aircraft attacks played a major role, but one integrated with the tank and artillery fire also brought down on the Soviets by defending German units.

An image of Soviet T-34s with infantry riding on their decks, with an almost-certainly superimposed image of VVS aircraft overhead diving to the attack. Despite its composite nature, the photo captures the essence of Soviet offensive operations in the last years of the war, combining focused artillery, airpower, and mechanized forces to penetrate German defenses and launch deep, Shturmovik-supported exploitation operations. (Sovfoto/ Universal Images Group via Getty Images)

The turn of the tide: the Luftwaffe and VVS after Kursk

Despite its tactical successes over Kursk, *Zitadelle* marked the end of the Luftwaffe as a strategic factor on the Eastern Front. The cumulative impact of *Zitadelle*, *Kutusov*, and then *Rumyantsev* ground down the German air arm. During July, Luftflotte 4 and 6 lost a total of 421 aircraft, and losses in irreplaceable veteran pilots and aircrew continued to rise. In the Stuka arm alone, the high-intensity fighting at Kursk cost the loss of eight *Ritterkreuz* (Knight's Cross) holders. During the later months of 1943 and into 1944, the quality of Luftwaffe aircrew further declined as losses in all theaters to the ranks of experienced personnel dramatically increased, and as training programs were repeatedly shortened. With no increase in the number of units and aircraft available for the east, and the Luftwaffe's qualitative edge decreased, the Germans were reduced to desperately shifting their limited air assets to meet crisis after crisis as their ground armies were steadily forced to retreat west.

The Soviet aircraft losses at Kursk were rapidly replaced and the Soviet training system continued to send numbers of new trainees to the front to keep up the VVS's quantitative advantage. As the other fronts joined the offensive in 1943, the VVS's dominance over the thinly stretched Luftwaffe grew, and more Soviet airmen survived their initial engagements. By the end of 1943, the pattern for Eastern Front air operations that would prevail until the end of the war was in place. The Soviet Fronts, with their attached VVS air armies growing in aircrew and aircraft quality, launched repeated offensive operations that drove penetrations through the thin German lines, with the Luftwaffe powerless to do more than try and temporarily mass its few assets to stem the tide. The VVS focus on direct support to Red Army offensives – with little effort at strategic bombing, counter-air

By late 1943, the ranks of the "experten" Luftwaffe veterans were dwindling, and the new replacements had fewer training hours on arrival. In contrast, the VVS continued to grow in numbers, training, and experience.(Nik Cornish at www.Stavka.photos)

sweeps, or deep interdiction – allowed the Luftwaffe's dwindling *Geschwader* to remain a "force in being," albeit one unable to halt Soviet offensives even when concentrated in one area of the front. During the winter of 1943–44, the Soviets launched a series of offensives that cleared the Axis out of the western Ukraine, followed by the Operation *Bagration* summer offensive that crushed Army Group Center and expelled the Wehrmacht from Soviet territory. Eleven months later, the 2nd and 16th Air Armies, still under Krasovsky and Rudenko but now with over 2,000 and 3,000 combat aircraft, respectively, supported Zhukov's 1st Belorussian and Konev's 1st Ukrainian Fronts as they launched the final assault on Berlin.

FURTHER READING

The works by Erickson, Glantz, and Ziemke give excellent overviews of the Kursk campaign, although coverage of the air fighting is often minimal or even omitted altogether. Notable exceptions are the two Ospreys by Robert Forczyk, which have order of battle and useful analysis of the air aspects of the battle integrated with excellent treatments of the ground fighting. The two volumes by Christer Bergström provide in-depth analysis of the air fighting. The 2007 shorter volume focuses entirely on the Kursk air battle, and his more detailed 2020 work covers both the Kuban and Kursk air operations. The Soviet General Staff report on air operations in Kursk, included in the volume translated by Glantz and Orenstein, gives good insights into VVS planning and command and control shortfalls, but includes the inflated Luftwaffe aircraft loss numbers often repeated in postwar accounts of the battle. Christopher Lawrence's recently published *Aces at Kursk* provides a superb analysis of the air fighting in the south along with a summary treatment of the northern battle, based on detailed analysis of the operations and loss reports from the units engaged. In this work, I have used the German Quartermaster Reports for numbers of aircraft destroyed or damaged given in Lawrence's book, which are typically larger than the Luftwaffe's reports which tended to underreport losses to enemy action.

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OSPREY PUBLISHING
Bloomsbury Publishing Plc
Kemp House, Chawley Park, Cumnor Hill, Oxford OX2 9PH, UK
Bloomsbury Publishing Ireland Limited,
29 Earlsfort Terrace, Dublin 2, D02 AY28, Ireland
1385 Broadway, 5th Floor, New York, NY 10018, USA
E-mail: info@ospreypublishing.com
www.ospreypublishing.com

OSPREY is a trademark of Osprey Publishing Ltd

First published in Great Britain in 2025

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A catalog record for this book is available from the British Library.

ISBN: PB 9781472865199; eBook 9781472865175;
ePDF 9781472865168; XML 9781472865182

Maps by www.bounford.com
Diagrams by Adam Tooby
3D BEVs by Paul Kime
Index by Fionbar Lyons
Typeset by PDQ Digital Media Solutions, Bungay, UK

Title page: see p. 43

Osprey Publishing supports the Woodland Trust, the UK's leading woodland conservation charity.

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DEDICATION: For my father, William C. Hiestand

GLOSSARY

German
Flieger-Division: Air Division
Fliegerkorps: Air Corps
Geschwader: Air Wing
Gruppe: Air Group
Jagdjäeger: Fighter Pilot
Heer: Army
JG (*Jagdgeschwader*): Fighter Wing
KG (*Kampfgeschwader*): Bomber Wing
Luftflotte: Air Fleet
OKH: (*Oberkommando des Heeres*) Army High Command
OKL: (*Oberkommando der Luftwaffe*) Luftwaffe High Command
SchG (*Schlachtgeschwader*): Ground Attack Wing
Staffel: Squadron
StG (*Stukageschwader*): Stuka Dive-Bomber Wing (*Sturzkampfgeschwader*), *Storkampfgruppe*: "Stork" night harassment bomber group
ZG: (*Zerstörergeschwader*): Destroyer Wing

Soviet
ADD: Long-Range Bomber Aviation
BAD: Bomber Aviation Division
BAK: Long Range Bomber Aviation Corps
BAD: Bomber Aviation Division
BAK: Bomber Aviation Corps
BAP: Bomber Aviation Regiment
IAD: Fighter Aviation Division
IAK: Fighter Aviation Corps
IAP: Fighter Aviation Regiment
PVO: Homeland Air Defense
ShAD: Ground Attack Aviation Division
ShAK: Ground Attack Aviation Corps
ShAP: Ground Attack Aviation Regiment
SAK: Mixed (Composite) Aviation Corps
Stavka: Supreme High Command
VVS: Military Air Force
VVS-VMF: Naval Air Force

TACTICAL ORGANIZATION
A Luftwaffe *Gruppe* usually had several subordinate *Staffeln* and operated 30–40 aircraft.
A *Geschwader* typically consisted of three *Gruppen* and 90–120 aircraft.
The basic Soviet tactical unit was the regiment with two to four squadrons and 20–40 aircraft.